

MARINE REVIEW

WEEKLY.] AND MARINE RECORD. [ESTABLISHED, 1878.

Vol. XXVII

Published every Thursday at
39-41 Wade Bldg. by the
Marine Review Pub. Co.

CLEVELAND, O., MAR. 5, 1903.

Eastern Office, 1023 Maritime Bldg., New York City
Chicago Office, 373 Dearborn St.

[Entered at Cleveland Post Office as second-class matter.]

Subscription \$3.00 year.
Foreign \$4.50 year.
Single Copy 10 cents.

No. 10

THE TUGMEN AND THE TOWING COMPANY.

In a survey of the season of 1903 on the great lakes there is one cloud on the horizon, and it is a pity that in a period so auspicious it should be there at all. There has probably never been a time in the history of the lakes when both master and man approached a season with such perfect good feeling and confidence—good feeling because the relations with labor are likely to be the most cordial, and confidence because the season is likely to be more profitable than the last. The iron companies and the vessel owners are almost certain to get a little better share of profits accruing from the manufacture of iron and steel than they have had recently. There is a disposition, too, on the part of those who have vested interests to meet the men as a body, to discuss the issue with them fairly and to pay them a decent wage. The vessel industry on the great lakes is one of the great single divisions of labor in the United States and it augurs well for amicable relations with labor throughout the country that those who manage it are willing to discuss the question of wages with the men as a unit. Probably the great trade of the lakes will see as smooth sailing this year as it has ever seen.

But the one cloud on the horizon is the present contention of the tugmen with the towing company. The strike of the tugmen last year was a hard blow to the towing company in what was practically its first year of existence and put the vessel interests to much annoyance and great loss of time in getting in and out of harbor. It dragged its weary length throughout the summer and was patched up late in the year to stay patched until Jan. 1, 1903. During the struggle some thirty or forty of the tugmen remained with the towing company, holding that they had made contracts which they felt bounden not to break. All attempts which these men have since made to gain reinstatement in the Licensed Tugmen's Protective Association—and their pleas have been of a most humiliating kind—have been ignored. This is the rock upon which the tugmen's association and the towing company is splitting. It is the one point upon which they could not agree at the recent conference at South Bend. The towing company naturally desires to protect these men and would favor their reinstatement into the association as the easiest method of guaranteeing their protection; but the tugmen's association protests that it will have nothing more to do with them.

It must be admitted that in this instance public sentiment is with the towing company, and no interest, no matter how powerful, is powerful enough to withstand the unremitting pressure of public sentiment. It must eventually win. It is, of course, patent that the towing company is doing the only thing it can do and preserve its self-respect. It must defend the men who defend it. That contract is just as binding upon the towing company as it was upon the men, and whether it means the passing of dividends and the depression of stocks that duty is clearly defined. It is quite clear also that, upon this point, the towing company intends no compromise. There is an opportunity for the tugmen's association in this—an opportunity which permits them to gain in money, magnanimity and the respect of their fellow men. It is the restoration of these thirty or forty men to good standing in the tugmen's association. What is there to lose by it? Absolutely nothing. What is there to gain? Everything. What good is it going to do the tugmen, either as a body or as individuals, to know that these men have been excluded from employment, and from the only employment which it is probable they are competent to perform? It will not enrich their coffers any and it certainly will not broaden their minds, for selfishness never yet did anything but contract one's disposition. No; everything that is noble in man points the other way. Moreover the tugmen's association can depend upon this as its eventual recompense—that if it persists in this course it will inevitably be whipped. Men are disposed these days to take a rather fair view of things and to lend their support to the fellow that's fighting fair. There is more at stake than this embroglio with the towing company. There is back of it the entire vessel interest of the great lakes, which has a native sympathy with capital anyhow and a human sympathy when it has right on its side.

The Lake Carriers' Association has of late taken a course that seems best suited to solving the labor problem, due, it must be confessed, to temperate and competent management on the part of the men. The great strength of the International Longshoremen's Association lies in the fact that it holds a contract to be inviolate and secures to the man who has a million dollars or more floating around in the lakes, the prompt and efficient handling of his property. That security pays dividends in satisfaction and unruffled sleep. The tugmen's association has the same opportunity

to exhibit the same breadth that the longshoremen's association has already exhibited. It has an opportunity to mark an epoch in lake navigation, for with its difficulty settled everything will very probably be smooth sailing on the lakes.

If there was any question of wages involved the Review wouldn't write this, for it believes it to be the right of every man to have a wage upon which he may bring his family up in comfort and forge steadily ahead towards a modest competence, without which there is no real comfort. But there is no question of wages. The towing company is disposed to pay all that can reasonably be asked. The day for narrowness is past. The tugmen have everything to gain and nothing to lose by presenting their powerful organization in its right light—not the oppressor of a handful of men, above petty jealousies, broader than the individual, and shrewd enough in its leaders to avoid the grave danger of obstinacy in a small affair.

STEEL CORPORATION'S PLAN OF IMPROVEMENT.

At a meeting of the board of directors of the United States Steel Corporation, held in New York this week, it developed that the bond-conversion plan is to be put into immediate operation. All legal tangles have been unraveled. It is to be noted that the corporation sticks to its original determination to issue bonds to obtain \$50,000,000 in cash in addition to converting \$200,000,000 worth of preferred stock into bonds. This is the one feature of the plan with which a conservative business man would probably quarrel. It seems to be adding a needless mortgage to the property, for the \$50,000,000 could speedily be obtained by withholding earnings on the common stock. Comprehensive plans for new equipment were adopted which involve the expenditure of \$36,000,000. These improvements include a new open-hearth furnace plant, blooming mill and finishing mill at the works of the Illinois Steel Co. at South Chicago at a cost of \$3,000,000 and various improvements to the existing equipment which bring the total amount up to \$5,000,000. Over \$1,000,000 will also be expended on the plant at Joliet. The work contemplated at McKeesport amounts to the entire rebuilding of the present rolling mill and tube and pipe mills of the Natural Tube Co., together with the addition of one new blast furnace, and additional Bessemer converter and the installation of a new water and power plant at a cost of \$9,255,662. It is estimated that this improvement will increase the production at this plant of pig iron 166,000 tons per annum, Bessemer ingots 140,000 tons per annum, of the rolling mills 124,000 tons and of the tube and pipe mills 100,000 tons. The increased earnings which will result from the additional capacity, it is estimated, will be \$1,553,000 per annum and that a saving will be effected, in cost of production, of \$1,805,000 per annum.

Improvements at Lorain include the erection of two additional blast furnaces with accessory works, additional rolling mills and a new tube and pipe mill at an estimated cost of \$8,646,096. These improvements will increase the annual production of pig iron 347,000 tons, of rolling mills 330,000 tons and of the tube and pipe mills 300,000 tons. The increase due to additional production, it is estimated, will be \$1,809,000, while the saving in cost of producing pipe as compared with the production of an equivalent tonnage at other mills of the National Tube Co., which will be displaced by this improvement, will be equal to \$1,500,000, a total gain in earnings of \$3,000,000. Various improvements are contemplated in other plants though none as extensive as the foregoing.

In mining the corporation contemplates the erection of a crusher plant at Escanaba, Mich., at a cost of \$143,000 with an annual capacity for crushing 510,000 tons of ore. The sum of \$317,000 is also set aside for additional equipment on the Vermillion, Gogebic and Menominee ranges. The Duluth, Mesabi & Northern Railway is to have \$347,679 for additional locomotives, for the extension of the ore dock at Duluth and for sundry improvements. The sum of \$175,000 is also allowed the Duluth & Iron Range Railway for improvements to shops and bridges. The Chicago, Lake Shore & Eastern Railway gets \$300,000 for additional steel cars. The Pittsburgh Steamship Co. is allowed \$208,000 for steam towing machines for its barges and for alterations and improvements in its fleet. This expenditure is now being made on vessels of the Pittsburgh fleet in yards of the American Ship Building Co. The Pittsburgh & Conneaut Dock Co. is authorized to expend \$40,000 for improvements in unloading machines.

SHIP BUILDING STRIKE AVERTED.

Clyde Workmen Agree to Accept Reduced Wages in View of Unfavorable Outlook for New Orders—Notable Oil Tanker—Ship Building Letter.

Glasgow, Feb. 23.—There has been an anxious time in the ship building trade since my last letter. Up to the middle of February it seemed as if we were on the verge of a complete breakdown here which would end in a general strike in the allied trades throughout the whole country. But to the surprise of everyone, the men from whom the most obstinate resistance was feared were the first to intimate acceptance of the reduction in wages announced some time ago by the employers. These are the carpenters and joiners, of whom there are two trade unions, and whose members in the north of England had brought the yards there to a stand by positively refusing the reduction. But in the Clyde district the joiners took up the position that if wages were being reduced in the whole industry for the purpose of reviving employment by attracting new work, they could not hold themselves exempt, whatever their non-ship building members might say or do. On the assurance that the reduction would be general to all the trades engaged in ship building they announced their intention of continuing work at the reduced rate of 8¼d. an hour.

I don't know how it is on your side but the trade unions of carpenters and joiners here (there are two of them) include workers in wood who do only internal fittings, not constructional work. The constructional carpenters and the men who lay the framework of the ship are called shipwrights, and they form a separate trade union with no membership employed in other occupations. The shipwrights followed the joiners in intimating acceptance of the terms, subject to adjustment of details to their own particular line of work. This left the final settlement to the "black squad," consisting of the blacksmiths and boilermakers and iron ship builders. Of these the blacksmiths decided to leave the matter to their executive officials, and these immediately recommended continuance of work on the employers' terms. The boilermakers and iron ship builders (platers, riveters, etc.), prolonged the discussion and came to no official declaration, but their executive council from headquarters advised the men to go to work for the present and they have done so, thereby accepting the reduction. The engineers and machine-workers have still to be settled with, but in their case the reduction was postponed until after the first of March, to enable them to remit the case to the judgment of a conference of the central councils of the allied trade unions and the Federation of Engineering Employers.

Whether the reduction in labor cost will be enough to revive the demand for merchant steamers remains to be seen. I doubt it, and I fear the depression in ship building will last much longer than the six months of the new wage agreement. In the north of England a committee of employers and of trade union representatives has been appointed to effect a settlement with the joiners and is trying to do so on the basis of a compromise in order to prevent closing of the yards. The reduction proposed was 1s. 6d. per week and it is hoped to settle on 1s. per week.

A GIGANTIC OIL CARRIER.

American readers will be interested in particulars of a gigantic oil carrier, called the Narragansett, which Scott & Co., Greenock, have just launched for the Anglo-American Oil Co., Ltd. This vessel is remarkable as the largest bulk oil carrier afloat, the largest vessel yet built on the lower reaches of the Clyde and one of the heaviest ships ever launched on this river. The Narragansett is 531 ft. in length, 63 ft. 6 in. in breadth and 42 ft. in depth, with a gross tonnage of about 11,000, a dead-weight carrying capacity of 12,500 tons—of which over 11,000 tons will be oil in tanks and 1,500 tons either coal or oil fuel—and a displacement when fully loaded of about 21,000 tons. The great size of the ship and the structural arrangements peculiar to "oil-tankers" presented many problems to the builders, but these have been successfully solved and the vessel is probably the strongest and most rigid structure afloat. There were eighteen thwartship bulkheads, and the compartments are further divided by longitudinal bulkheads, forming in all twenty-seven separate compartments below the main deck. To be oil-tight this involved a test by water with a head of 20 ft. above the main deck. The number of rivets used in the construction of the vessel is over 1,250,000. The machinery of the Narragansett is of massive design and consists of a set of triple-expansion engines and six large single-ended boilers, capable of generating steam to develop over 5,500 I. H. P., which will propel the vessel at a speed of 14 knots. The cylinders are supported by six split columns, three of which carry a circular condenser, formed of steel plating of large cooling surface, and supplied with water by an 18-in. centrifugal circulating pump, driven by two independent engines. There is a complete installation of auxiliary machinery, including two sets of slow-speed, boiler-feed pumps, feed heater and evaporator, feed filters and silent ash hoists (self tipping) in each stokehold. All these exhaust into a combined auxiliary condenser and feed heater, having a total surface of 950 sq. ft. The boilers have a working pressure of 200 lbs. per square inch, and are placed three abreast in two stokeholds, worked under natural draft. The funnel rises to a height of 105 ft. above the grate bars. The propeller is of 20 ft. diameter and is fitted with four adjustable bronze blades. As an oil carrier the Narragan-

sett, unlike most of the "tankers" now in service, has the propelling machinery placed amidships. This necessitates a tunnel passing through the after oil tanks, which is circular in form and passes through eight separate oil compartments. The oil tanks proper are all below the main deck and are sixteen in number, eight being forward and eight aft of the machinery space. Between the main and upper decks are four smaller oil compartments to be used when the vessel can be loaded down to her summer freeboard. There are four cofferdams of oil-tight construction, and the bunkers and deep-ballast tanks are also made oil-tight for use as oil-bunkers should it be decided in the future to adopt oil as fuel. In two oil-tight pump rooms are fitted the oil pumps, four in number, which are capable of discharging the oil at the rate of 900 tons per hour, or the whole cargo in about twelve hours. Suctions from these pumps are led to all the pumps and cofferdams, and these and all the discharging arrangements are of the most improved description. The oil tanks are also available as ballast tanks in the event of the ship requiring to make a light voyage. The vessel can be turned into an ordinary cargo steamer within a few hours of her employment as an oil carrier and for the thorough cleansing of the oil tanks from oil steam connections are arranged to all the tanks, and a system of ventilation for clearing the tanks of gas has been adopted. A large fan is fitted in each of the pump rooms and connected to each of the tanks by pipes, for the supply and suction of air. The cargo gear on deck consists of sixteen derricks and nine large and specially-designed steam winches; and side hatches are fitted to the upper and lower 'tween decks, which are always available for cargo, even when the oil tanks are full. The vessel can, if necessary, be made available for carrying cattle or troops.

NO FRENCH SHIPPING COMBINATION.

Shipping circles here were much amused at a telegraphed extract from a Paris newspaper to the following effect:

"The French ship owners have just formed a general syndicate of ship owners, an amalgamation having its headquarters in Paris, and including all French shipping companies. The president of the syndicate is M. Lebon, ex-minister of commerce and president of the Messageries Maritimes Co. The vice-president is M. Alfred Freycinet, ship owner, Marseilles. This powerful syndicate, which is nothing more nor less than a French shipping trust, brings together a total tonnage of about 15,000,000 (!)—that is to say, all steamships and almost all sailing vessels of the whole merchant marine. The new syndicate will hold an important meeting in Paris, at which the principal questions interesting French shipping will be discussed."

This was gravely repeated by people who did not stop to consider where the total tonnage is to come from, seeing that France has only 1,500,000 tons on her register altogether. There are in France various syndicates of ship owners, at Marseilles, Bordeaux, Havre, Boulogne, Dunkirk, etc. These syndicates concern themselves only with local interests, not with questions relative to the general interests of all the ship owners of France. There is no question of uniting all the local syndicates in a national syndicate, nor of associating them in a trust. They merely desire to create a committee to which all the syndicates of ship owners will adhere, and which will study questions interesting to those ship owners in a general sense. The central committee of the ship owners of France was founded in the middle of January last. The president of the committee, M. Andre Lebon, was formerly colonial minister and president of the Compagnie des Messageries Maritimes. This is the true story of the French combine.

HOW NAVAL APPROPRIATIONS ARE EXPENDED.

An analysis has been made of the distribution of the naval votes of the principal powers in connection with the alleged expensive administration of the French navy, eliminating such money as is devoted to purely peace purposes although paid by navy departments. For the maintenance of the respective existing fleets in commission, or in a warlike state, Italy devotes 50.18 per cent., Britain 44.9 per cent., Germany 29.12 per cent., and France 25.35 per cent. of the total navy expenditure. Germany reduces to a greater extent than any other of the powers her winter expenditure, owing to the ice in the Baltic. Germany's vote for naval construction is over £5,000,000 sterling, which compares with £9,000,000 for Britain, £4,500,000 for France, and just under £1,000,000 for Italy. Germany is spending 51.29 per cent. of her total naval expenditure on new ships, France 37.82 per cent., Britain 30.20 per cent., and Italy 22.26 per cent. Britain is spending 3.42 per cent. of her total expenditure on harbors, docks, etc.; Germany in prosecution of her colonial policy spends 5.97 per cent.; France spends 5.71 per cent. in Mediterranean and home ports; and Italy only 1.51 per cent. In administrative expenses Germany has a proportion of 13 per cent.; Britain 21.48 per cent.; Italy 26 per cent.; while France is as high as 33.12 per cent.

A HANDY HARBOR VESSEL.

An interesting vessel has been launched this week by Murdoch & Murray, Port-Glasgow, namely, a finely-modeled, twin-screw steamer for the Mersey Docks and Harbor Board. Her dimensions are: Length, 140 ft.; breadth, 24 ft.; depth, (molded) 12 ft. 6 in. This vessel is intended for surveying, carrying, placing, and towing buoys, also for towing and moving lightships,

and for salvage service and working at wrecks and fires. The main deck is of teak, and the boat deck is carried out to the side to form a shelter. The special machinery required for the service for which the steamer is intended includes a patent windlass forward, arranged for working either cables or wire rope. On the lower deck, placed beside two powerful capstan engines, is a double horizontal fire engine of the most improved type, capable of discharging 1,350 gallons per minute, discharging six jets to a height of 160 ft., and a single jet placed on top of chart-house discharges to a height of 220 ft. The fire pump is also arranged so that it may be used as a salvage pump. At the after-end of the vessel are placed two large gas-holders, and a compressing engine. Throughout, the vessel has been equipped with all the most improved arrangements for the service for which she is intended. The machinery consists of two sets of triple-expansion engines, cylinders 10½, 17½ and 28 in. by 21 in. stroke. An 8-in. centrifugal salvage pump is fitted in the engine room with full set of suction and delivery hose.

OIL ENGINES FOR AUXILIARIES.

The British admiralty has ordered an oil engine for the purpose of elaborate practical tests on board ship when driving a dynamo. Such engines are used on land for electric generation and other purposes, and in small vessels for propulsion, although there are complications due to the fact that the oil engine cannot be reversed, so that gear has to be introduced. In the driving of electric machines, pumps, etc., there is no need to reverse action, and as the weight of fuel for a given power is much less than in steam engines, there is every probability of high economy as compared with the simple engines which are heavy steam and coal users in our warships. In ordinary steaming the many small engines consume about one-third of the total fuel used for all purposes.

SHIP BUILDING AT NEWPORT NEWS.

Newport News, Va., March 4.—The new battleship Maine, built at Cramps' ship yard, was placed in dry dock here, scraped and painted and floated again yesterday. With one exception the Maine is the only armorclad in the United States navy to be docked in a private basin while in commission. The exception is the monitor Puritan, which was dry docked here in 1889 on the occasion of the opening of the old basin at the ship yard, now known as dry dock No. 1. It was to test the dock that the government sent the Puritan here. The only foreign warship ever placed in dry dock at an American ship yard, the German cruiser Vineta, came to Newport News for the purpose. When the Maine came up to the city from Old Point her keel plan was turned over to the shipyard so that the blocks could be properly arranged in the dry dock. She was floated in the monster new basin with the greatest care and the docking was attended without the slightest hitch. When the work was finished the dock was flooded and the battleship floated out again into Hampton Roads. The new dock here could accommodate the Maine and the Missouri with room to spare. The ship yard officials would like to have placed the battleship Missouri in dock with the Maine, but there was no necessity for it at this time.

There is a movement on foot in Norfolk and Portsmouth to petition congress to give the navy yard a chance to build a battleship or a cruiser under the next appropriation, putting it in competition with the Brooklyn navy yard, which is building the Connecticut. The Virginia senators and congressmen will be urged to work for a ship for the navy yard. The Texas and Raleigh were built at the Norfolk yard.

It is said that the Wittenbergs, who are back of the Chesapeake & Ohio Coal and Coke Co., have renewed their option on a piece of water front property adjoining the Chesapeake & Ohio terminals and are now having a plat made of the land with a view of erecting a large coal pier for the loading of ships they contract to load with cargo and bunker coal.

The monitor Puritan's new 4-in. battery has arrived at the navy yard from Washington and will be installed as soon as the new monitor Nevada arrives from the Bath ship yard to relieve the Puritan as school ship for the navy's gunnery classes.

PRESIDENT ROOSEVELT AND NAVAL COMMITTEE.

Information from Washington is to the effect that the president is taking a deep personal interest in the make-up of the committee and that he is especially displeased with the personnel of the house naval committee. He is very close to Representative Cannon, who is to be the new speaker, and it is already hinted that the naval committee will be changed from top to bottom. What the president desires is a committee aloof from the lobby. Of course there is no committee in congress so beset with outside influences as the naval committee and frequently the action of this committee is governed by influences which have nothing whatever to do with the merits of the measures reported upon. For instance, the plan for a naval training station on the great lakes, which is urgently desired by naval officers, was defeated in the house of representatives largely as a result of the internal warfare of the committee. The submarine boat men fought it merely because Chairman Foss of the committee was in favor of it and because the station was to be located in his district. Nominally the fight against it was made by Gen. Gros-

venor and the fight for it by Col. Hepburn but a submarine boat man was sitting in front of Gen. Grosvenor and an anti-submarine man before Col. Hepburn, each giving his particular orator points, and the defeat of the item was hailed everywhere as a triumph for the submarine men and a black eye for Foss. That's why we say measures are not always reported upon their merits but are defeated by influences extraneous and foreign to them.

RULES FOR DOCKING LARGE VESSELS.

"Editor Marine Review:—As a constant reader of the Marine Review will you kindly inform me what the general rules are for docking large vessels, such as battleships, cruisers, etc., of the United States navy; how much they are allowed to lift before the bilge blocks are put in place?"

Philadelphia, Pa.

J. C.

The memorandum relative to the docking of vessels, issued by the navy department, is as follows:

"The dock should first be examined to ascertain whether or not it has sufficient length for the ship and proper width at the gate; also the minimum draught on which the ship can dock, allowing for fall in tide due to delays in getting vessels at dock and in replacing caisson. The boilers on board vessels should be empty, except such as are necessary for steaming purposes in dock, and the amount of coal on board reduced to a minimum.

"The midship section should be located at some point near the center of the dock, and measure fore-and-aft the length of the ship to ascertain if the location for the vessel in dock is a proper one. If this is so, it should be established as a fixed point. From the draught of the vessel and water over the sill, determine the height of blocks above the sill—usually from 2 ft. 9 in. to 3 ft. 6 in.—the greater height to be adopted if much work is to be done under the bottom. After establishing this, proceed to build up the blocks; establish battens forward and aft in the dock, level and athwartships, and make them the correct height above the sill line; the blocks should be built up to the level required, spaced 2 ft. apart; the lower blocks of white oak, the capping blocks of yellow pine, about 10 in. thick.

"After the above are established, the bilge blocks should be located; these are on runways and are spaced about 18 ft. apart; about twelve blocks will be required on each side for a ship. Shape the top of bilge blocks to suit shape of ship. The bilge keel blocks are securely dogged; in the meantime the shores are being prepared, spaced from 15 to 18 ft. apart, in two rows. The upper row to be set up immediately on grounding, end against ship, bearing near the berth deck level; the lower row about 6 to 8 ft. below. All shores to extend as far fore-and-aft as practicable and to slope slightly upwards to avoid denting plating or snapping shore when ship is undocked.

"When ship is inside the gate, replace caisson as promptly as possible. When ship is in proper position fore-and-aft, make fast the head line and trend the breast lines well aft to hold in that position. As soon as the vessel is in proper location the dock pumps may begin work and pump out the dock, and the shores placed in position; men hold the vessel in proper place by means of breast lines as the vessel settles. When the stern touches the blocks set aft shore on each side, and when she bears fore-and-aft set up all the upper row of shores, working from aft to forward, and when the water is sufficiently lowered, the second row of shores should be put in place, and as the vessel settles on the keel blocks the bilge blocks should not be hauled until the water is pumped down about 6 ft., and as soon as these are hauled the vessel is secure and the dock can be pumped out as rapidly as possible. As soon as the blocks are visible the shores under bow and stern should be set up, and when the dock is dry a row of shores fitted fore-and-aft just inside the bilge keel and special shoring fitted on the longitudinal under the turrets or other concentrated weights. If the vessel is to remain in dock for some time a line of shores should also be placed on a longitudinal under engines and boilers.

"When coming into dock, all broadside guns should be trained as much fore-and-aft as possible, side ladders removed, ports closed, etc. After the dock is dry the blocks should be examined to see if the ship bears well, and if not, wedges should be inserted where necessary and additional shores fitted if required. A shore should be placed under each shaft strut hub."

It is to be noted that the data given in this memorandum is for a ship without docking keels. In case a vessel has docking keels the practice of laving the blocks for same varies, it being customary at some yards to place the blocks for docking keels on a level with the main keel blocks, on the supposition that the bilges will lift a little when the vessel is docked and bring less strain on the docking keel blocks than on the main keel blocks. In other yards it is customary to make the docking keel blocks a little lower than the main keel blocks in order that the weight of the vessel may be taken on the latter before it is taken on the former. As regards the hauling of the bilge blocks, this varies considerably with the condition of the vessel as to load. The average of 6 ft. given in the memorandum is fair for a vessel without docking keels but may be increased to from 8 to 10 ft. or even more for a vessel with docking keels.

Mr. J. H. Jenkins has been appointed assistant general manager of the marine department of the New York, New Haven & Hartford Railroad Co.

THREE TURBINE YACHTS.

Three steam yachts have been built in British yards and fitted with turbine engines. All three have been launched but only two have been tried. The yachts are the Tarantula, built for the late Col. Harry L. D. McCalmont; the Emerald, built for Sir Christopher Furness, and the Lorena, built for Mr. A. L. Barber of New York. The Tarantula was ordered by Col. McCalmont as an experiment. He took an interest in the Parsons turbine and had the Tarantula built and plans made for a much larger yacht which was to be built if the Tarantula was a success. The Tarantula in her trials made a record of 26.75 knots and was a bigger success than her builders had expected. They had only looked for 24 knots, but the death of Col. McCalmont put an end to the plan of building a larger yacht. The Tarantula is 160 ft. long and 16 ft. beam. She is driven by three turbines, one high-pressure and two low-pressure. The high-pressure turbine is placed on the central shaft and the two low-pressure on the outside shafts. There are thus three propeller shafts and there are three screws on each shaft, so that when the Tarantula is being propelled through the water at full speed she is being driven by nine screws. Like all high-speed boats of modern design, the Tarantula is flat aft. This is to prevent her squatting in the water. Her rudder is hung on the stern-post and drops below the bottom of the hull at that point. The three propeller shafts are almost in a line and are under the flat part of the stern. The central shaft is slightly lower than the two outside shafts. The screws are small and each has three blades. Their size and pitch is one of the secrets of the Parsons company. The center shaft makes 750 and the outer ones 1,000 revolutions a minute.

One of the troubles with the Parsons turbine has been reversing, but in the three new yachts this difficulty has been overcome by an ingenious arrangement. There are two astern turbines, and these are placed in the exhaust of the two low-pressure turbines for the two outer shafts, and these are worked by reversing the direction of rotation of the low-pressure turbines and outside shafts. The blades of the astern turbines run in vacuum when the yacht is going ahead. Parsons at first tried an arrangement whereby the blades would work in either direction, ahead or astern, but he found that this meant that the form of the blade would not be really efficient for either direction of rotation. He therefore decided to shape the blades so that they would give the best results for going ahead and to provide a separate set for going astern. When the yacht is going ahead, steam from the boilers is admitted to the high-pressure turbine, and after expanding it passes to the low-pressure turbines, and there it is further expanded twenty-five fold. It then passes to the condensers, the total expansion ratio being estimated at 120.

The largest of these three yachts is Mr. Barber's Lorena, and this vessel will probably be seen in American waters this summer. Mr. Barber is a member of the New York yacht club. This boat was launched from the yards of the builders, Ramage & Ferguson, at Leith recently. She is 300 ft. over all, 252 ft. 3 in. on the water line, 32 ft. 6 in. beam and 21 ft. molded depth. She is to have three turbines like the Tarantula, one high-pressure on the central shaft and two low-pressure on the other two outer shafts. The outer shafts will each have two screws, and the central shaft will have one screw, so that there will be five screws in all. It is expected that this vessel will develop a speed of 16 knots, and at this speed the revolutions of the central shaft will be 530 a minute and of the two outer shafts 750 a minute. The two outer shafts will be used for low speed, and by a suitable arrangement of valves one can be driven ahead and the other driven astern. The indicated horse-power of the engines of this boat will be about 3,200.

The third of these yachts is the Emerald, and she has been chartered for the season by George J. Gould and will be brought across the Atlantic in April. She will be the first vessel driven by a turbine to make this journey, and her passage will be watched with considerable interest by all who are interested in steamships of any kind. The Emerald was built by Alexander Stephen's Sons at Glasgow, and her dimensions are 236 ft. over all, 28 ft. 8 in. beam, 18 ft. 6 in. depth and her tonnage is 756 tons, yacht measurement. In the engine room there are three turbines, their condensers, and the duplicate electric lighting machinery; there are also a number of auxiliary engines, including steam and water pumps, fire engines, etc. There is a large promenade deck from side to side of the yacht, and on this are placed the boats and a large teak house for deck lounge and navigating rooms. Above this house is the bridge. There are several officers' rooms, sixteen berths for seamen and separate bath rooms and lavatories for officers and men. The bulwarks fore and aft are steel with a teak top rail. The decks and all parts of the woodwork exposed to the weather are specially selected teak. There are two double-bottom tanks, one forward and one under the turbines, for purposes of draught when the vessel is cruising light and for fresh water supply for the turbines. The dining room, drawing room and smoking room are all beautifully fitted, the style of designs being described as a free treatment of English and French Renaissance. For the owner a suite of four rooms, bath room and attendants' rooms

has been provided and for the guests six bedrooms, several bathrooms and valets' rooms.

When this vessel was launched the Hon. C. Parsons said that the view he had in fitting the Emerald was to put into the vessel such power as would enable her to steam at the highest rate compatible with entire freedom from vibration. He said if yacht owners require yachts capable of very high speed the turbine will suit their purposes very well. The Parsons turbine was not supposed to be economical when running at speed much below that for which it was designed, and most yachts do more gentle cruising than high-speed work. George L. Watson was at this launching and he said that if the marine steam turbine was proved to be economical at low speed it certainly had a great future. The Emerald is to make 16 knots an hour.

The yacht which Col. McCalmont had thought of building was to have been an ocean-going vessel of about 1,300 tons measurement and her dimensions were to have been 260 ft. on the water line and about 35 ft. beam. She was to have been very fast.

H. Wheatly Ridsdale, the naval architect to the Parsons company, in an article published in the *Yachting World* recently said:

"In the summer of 1901 but four vessels were fitted with the Parsons steam turbine, having an aggregate I. H. P. of 30,000. In the eighteen months that have elapsed since that time there have been completed five vessels totaling 20,200 I. H. P., and there are at this time five vessels under construction in England alone which will receive turbines amounting to 32,200 I. H. P. Without pausing to consider the above figures in detail, or respective items which contribute to the totals, it is evident that a claim can now be substantiated showing that the steam turbine has passed out of the experimental and tentative stage and has gained a secure position in its application to the three main divisions into which steam vessels naturally fall, namely war, commerce and pleasure. Of the fourteen vessels alluded to as completed and under construction, one, the *Turbinia*, was experimental, the other thirteen may be divided as follows: Warships, six; commercial (passenger steamers), four, and yachts, three.

"It has been somewhat fully explained that it is in the search for speeds beyond what has hitherto been normal that we first encounter serious drawbacks to the standard type of reciprocating engine. This is assuming that all yacht engines attain the highest degree of perfection in design and workmanship. Unfortunately this is very far from being the real state of the case. First, because owners are often unwisely indifferent to the perfections of propelling machinery as compared with the attention and money they devote to the arrangement of the accommodation, exterior and interior decoration and outfit; and, secondly, because in the past yacht building has been largely in the hands of comparatively small firms, who have seen little inducement to improve the design of their engines in accordance with modern practice, especially where that involved the discarding of old patterns and the provision of new ones without any apparent advantage to themselves. There is thus much machinery fitted recently into otherwise up-to-date steam yachts that is hopelessly antiquated before it is finished, and would, in America, be considered just about ripe for the scrap heap. The owner is satisfied so long as the contract speed of the ship is attained and the engines go round without refusing duty. If, however, having contracted for and, as proved by trial trip results, obtained, say, a 12-knot yacht, he should give orders to the master and engineer to take him about at something like that speed, it is usually a very short time before the vessel gets the character of being an extravagant coal eater, and the engines begin to get noisy and out of adjustment through rapid wear. Directly these conditions become sufficiently noticeable for the owner to worry about them the engineer has a prompt remedy; he eases her down a bit, thus reducing coal bill and wear and tear, but alas! speed also, with the final result that (I speak from observation) there is very little steam yachting indeed done at the present time at anything over 10 knots, and much of it is not over nine. Nevertheless, the yacht retains the reputation of being a 12-knot boat, and after she has changed hands a few times and has made a few passages with a fair tide from point to point is just as likely as not to be reputed equal to 13 knots.

"The cure for extravagant coal consumption described above is, of course, only diminishing the effect of the disease without attacking the cause. It is naturally only a true economy when less fuel is burnt per indicated horse power, and the saving by cutting down the power developed is not legitimately a saving at all. If owners had the necessary knowledge to ascertain, or to have ascertained for them, what their vessels were burning per indicated horse power per hour they would often be astonished. If the yacht's engineer be questioned he will generally, I have noticed, estimate the consumption per indicated horse power at 2 lbs. without the slightest basis for such a calculation, but simply because it is a nice, round, easy, figure to remember, and he is not likely to be found out to be wrong. I have ample grounds for asserting that with the ordinary compound engines, which are still to be found in the majority of yachts, the coal consumption is generally a great deal nearer 3½ lbs. than 2 lbs., and that even in the larger and more modern boat which it is now, at least, the

practice to fit with triple engines, this figure of 2 lbs. usually remains rather an ideal than an accomplished fact.

"I have not yet made sufficiently clear the purport of the above remarks. It is to endeavor to show that the application of steam turbines may still have a wide range of advantage, even after they have fallen below their natural maximum efficiency, before they sink to the level of ordinary steam-eating yacht engines. Unfortunately, however, this mythical fetish of 2 lbs. per indicated horse power has become so revered among yacht owners and engineers that it is rather difficult for them to believe that a turbine installation consuming, say $2\frac{1}{2}$ lbs., would really be more economical than nine-tenths of the yachts afloat. It is important, however, that it should not be considered that there is any inferiority in the steam economy of turbines within their natural range of application. The point emphasized above is simply that outside this natural range of applicability they may still compete in a field in which such poor results are usually obtained, namely, yacht propulsion, while still presenting all those qualities of freedom from vibrations, wear and tear, expensive overhauls and arduous supervision, to say nothing of the fact that the saving in the oil bill alone will, in ordinary cases, amount to something like 10 per cent. of the cost of the fuel.

"The natural limits of speed referred to above depend on the permissible speed of the turbine blades at the circumference, and this again depends on a train of circumstances which I will endeavor to make clear. First of all, the steam flowing through the turbine has a natural speed of its own, and the speed of the blades cannot fall below a certain percentage of this without a serious drop in efficiency. At the other end of the shaft an opposite set of conditions obtains, as there are very definite limits to the speed at which it is possible to run the propellers. For every vessel, at any given speed, there is a certain limit below which the surface of the blades of the propeller cannot be reduced in area without tearing holes in the water. When this cavitation occurs efficiency falls off suddenly and rapidly. Given a certain minimum blade area and speed of ship, the revolutions permissible are determined thereby, because the angle of the blades to the stream of water they act on is practically a fixed quantity for the best results. Going back, then, to the turbine end of the shaft with the revolutions decided on, we have only to bring the turbine up to such a diameter as shall afford a proper circumferential speed for the blades. Should this diameter have to be made so great that the turbines become either too large for the ship to contain them, or too heavy for her to carry them, then the lower limit of the range of applicability of steam turbine propulsion has in that particular instance been reached.

"This, however, is only the case where the very best steam economy is a *sine qua non*. It is possible to very largely decrease circumferential speed and consequent diameter of the turbine without falling below the steam consumptions reached in nine-tenths of existing yachts. Speaking somewhat generally, it may be said that in all cases where a vessel will steam 15 knots and upward, steam turbines will be the most suitable type of engines to employ for her propulsion, and will offer advantages proportionately more and more important as the speed rises above that figure. Below 15 knots there are certain cases which may require to be examined into on their merits before a decision can be arrived at, but, generally speaking, the advantages of turbines would be somewhat outweighed by their large size and cost relatively to the power.

"The yachts constructed during the year now closing, though of an interesting character, do not afford any very striking points to illustrate the above remarks; indeed, only one of them, the late Col. McCalmont's *Tarantula*, was completed in time to be placed in commission. Of the other two, the larger, Mr. Barber's *Lorena*, is not yet in commission, though her machinery has been completed for several months. Sir Christopher Furness's *Emerald* has made a preliminary run, and at the time of writing is back at her builder's yard for completion. *Tarantula* is particularly remarkable as a yacht, for although her lines are almost identical with those of a first-class torpedo boat, her machinery is entirely different from anything which has been previously fitted into such vessels. At the same time the cabin fittings, electric installations, and other elaborate details were especially designed, and have been as carefully carried out as usual in high-class yachts. In spite, however, of the heaviness of fittings, etc., in *Tarantula* as compared with the service load of a torpedo boat, she has succeeded in breaking the record for speed as compared with torpedo boats approximating her in dimensions and displacement, which may be reckoned as a unique performance for a yacht, and undoubtedly *Tarantula* is to be a considerable extent indebted for this to her turbine machinery."

BIG IDEAS REGARDING THE NAVY.

The general board of the navy, of which Admiral Dewey is president, has proposed the construction of a fleet which will make the United States second to Great Britain as a naval power. It is urged the adoption of a ship building program under which the United States, within six years, will have a fleet made up of forty-eight effective battleships, twenty-four effective armored cruisers, forty-eight cruisers and forty-eight torpedo boat destroyers and submarines, colliers, engineering repair ships and supply ships. The program advocated by the

general board is the result of careful thought on the part of the members of that organization. Their conclusions were that the first essential of a modern fleet is an adequate number of battleships; that supporting the battleships should be swift armored cruisers; that for use as scouts there should be a number of cruisers of about 3,000 tons, speedy and with great coal endurance; that there should be one torpedo boat destroyer for each battleship, and that finally there should be such other auxiliaries, including colliers, repair ships, supply ships, as experience shows such a fleet will need. The board desires that four battleships, two armored cruisers, four cruisers and four destroyers be laid down annually. In displacement the United States is today the third ranking naval power but in number of ships it is behind Great Britain, France, Russia, Germany and Italy. The president and Secretary Moody have announced their intention of supporting the general board.

THE GASOLINE BOAT.

Ever since Adam's indiscretion mankind has been compelled to make a living, and that numerous Americans have of late been very successful in doing this is shown by the unprecedented number of pleasure craft building all along the Atlantic coast. And the enthusiasm of those prospective yacht owners, when discussing the merits of the property they are in hopes of soon to see cast upon the waters, indicates them as sharing the belief of R. L. Stevenson, that more pleasure can be derived from fooling among boats than from adding up columns of figures. Every Sunday, omitting the proviso of the weather's permission, scores of business men, whose personal appearance is not suggestive of nautical inclinations, travel ship yardward to observe another week's growth of their maritime wonders.

The genuine enjoyment it gives some, and the conservatism of others are responsible for the many orders builders have received for sailboats, from the schooner for deep-water cruising, the knockabout to be sailed strictly between meal times, the skimming-dish with a reputation of having crossed a grassplat after a heavy dew, to the flat-bottomed dory with a nominal draught.

As in the fight for supremacy in the affections of their devotees between the carriage with the horse and the vehicle with the odor, the boat with the gasoline motor is puffing itself to the front, and is predicted as going to take the wind out of many sails this coming season. The gasoline smell is no longer so vigorously denounced, it being now regarded as suggestive of bank accounts and brown stone palaces with mansard roofs.

The noise made by former types of motors was not conducive to their finding favor in the eyes, or rather the ears, of yachtsmen, while the weight of some of the engines I examined was enough to stagger any boat, if not the whole of nautical humanity. An advertisement that said "not a ton of pig iron, but four-cylinder, twentieth century, high-speed gasoline motors for sale—all sizes," inserted by the Boston agent of a western concern, brought me to his place of business, where I very soon was convinced of the fallacy of the assertion that "there is nothing new under the sun." A 14-H. P. four-cylinder gasoline engine, placed upon the packing case in which it originally arrived from its western place of birth, was running at a speed of 600 revolutions per minute, while said running might be likened to that proverbially associated with a watch. One of the features was a shifting spark, a device to change the time of the explosion, preventing the chance to be hurt by the so-called "back-kick" when starting, dreaded by amateur and professional alike. A float-feed, insuring an equal flow of gasoline to the cylinders, and the importance of which can be fully appreciated by any one having run a launch in a heavy head sea, occasioning a continuous reversion of the relative positions of tank and motor, was something I then saw for the first time.

Yes—the gasoline boats are going to be numerous, and nothing could convince me more of the favor they have found in the eyes of the people along the coast than the fact that a number of Portuguese lobstermen, the most conservative class of men that ever retained a liking for an ash breeze, are now the proud owners of power dories. These thrifty men, too conservative to set their pots in trawls, as done by their native colleagues, but still buoying each trap separate, have noticed the advantage of pursuing their calling in a boat propelled by a gasoline motor. And incidentally I may add that in their case the gasoline smell is a decided advantage, it being the only perfume sufficiently strong to offset the odor of their bait.

New York, Mar. 2, 1903.

FRANK HANSON.

Dr. R. J. Gatling, inventor of the Gatling gun, died in New York last week at the home of his son-in-law, Hugh O. Pentecost. His death was very sudden. Being eighty-four years old and accustomed to resting after any physical effort, he told his daughter he would lie down. Shortly afterwards he began breathing heavily and a physician was summoned. He administered strychnine but to no avail, Dr. Gatling dying in a very few minutes. While Dr. Gatling's greatest fame was as the inventor of the Gatling gun, he had also devised a number of implements of peace. Latterly he turned his attention to smokeless powder.



LAKE FREIGHT OUTLOOK.

As it is practically settled that there will be some advance over last year in the rates of freight attending contracts for the movement of ore and coal on the lakes during the coming season, there is considerable speculation in vessel circles from day to day as to how much of an advance will be paid, although it may yet be two or three weeks before contracts are made. If the shippers stood willing to pay 90 cents a ton on ore from the head of Lake Superior and 45 cents a ton for return coal cargoes it is more than probable that the great bulk of the business for the coming season would be covered by contract at once. There would be no great profit to the vessels in such rates, in view of increased labor costs, etc., and a probable charge of \$2.80 a ton for fuel, as against \$2.50 a year ago. Still the freights just referred to are not figures coming from the shippers. They are figures that would satisfy the vessel owners. On the other hand the best base figures talked of among the shippers are 85 cents for ore and 40 cents for coal. Talk of these rates has been heard in circles close to Steel Corporation officials and it would not be at all surprising if the contracts are finally made at these rates. Last year's ore contracts were at 75 and 80 cents for ore and 35 cents for coal. Possibly the vessel owners will get the higher rates which they are hoping for, especially in view of the advanced prices to be asked for ore, and in that event there would be very few ships left to depend upon the going rate, but if an effort is made on the part of the shippers to cover the season business at less than the 85-cent ore rate and 40-cent coal rate much of the vessel capacity will be held out to take chances on what may develop during the season. This will be prompted mainly by the assurance of more than an ordinary season in grain, especially corn out of Chicago, and a coal movement to the northwest that will be the greatest in the history of the lakes.

Notwithstanding the unequivocal publication of ore prices in some of the eastern papers the prices have not yet been fixed and the ore tests are still going on. It is, of course, likely that the schedule of prices will not vary greatly from those published but the fact remains that they have not been actually adopted. The base prices as reported are:

Old range Bessemer.—Basis, \$4.50 per ton, f. o. b. lower lake ports; guarantee, 63 per cent. iron, 0.045 per cent. phosphorus, 10 per cent. moisture.

Old range non-Bessemer.—Basis, \$3.60 per ton, f. o. b. lower lake ports; guarantee, 60 per cent. iron, 12 per cent. moisture.

Mesabi Bessemer.—Basis, \$4 per ton, f. o. b. lower lake ports; guarantee, 63 per cent. iron, 0.045 per cent. phosphorus, 10 per cent. moisture.

Mesabi non-Bessemer.—Basis, \$3.20 per ton, f. o. b. lower lake ports; guarantee, 60 per cent. iron, 12 per cent. moisture.

Of course there are numerous grades of ore and the general schedule of prices will include figures above and below these base prices, according to quality. The base prices represent a substantial advance that will be shared all along the line.

LAKE CARRIERS' ASSOCIATION.

The executive committee of the Lake Carriers' Association has been in session during the greater part of the present week in Detroit, but it does not appear that they have accomplished anything so far in adjusting the wage schedule. The committee is there with power to act, but it seems that the representatives of the various unions are unclothed in that respect. The committee has power to enter into contract binding every vessel enrolled in the Lake Carriers' Association to the schedule and it is natural that it should expect that the men with whom it is dealing should have like power. Otherwise it is merely spilling barn that brews nothing. It is only fair to state, however, that matters are held somewhat in abeyance pending conferences with Mr. Keefe, president of the longshoremen's union.

It is a matter of great regret, which every one who knows him must keenly feel, that Mr. Frank J. Firth is no longer able to give his time to the executive committee. His health is such as to become his first concern and he has consequently decided to abandon active duties and rest. Mr. E. T. Evans of the Anchor Line, who represents the same interests that are represented by Mr. Firth has been

appointed on the executive committee in his place. No one more fitting could be selected to succeed Mr. Firth.

At a meeting of the board of directors in Detroit, Monday, resolutions were adopted in memory of Capt. W. W. Brown and Wiley M. Egan, who lately died. A committee, composed of President William Livingstone, C. W. Elphicke, Denis Sullivan, J. J. H. Brown, Edward Smith, J. H. Sheadle, H. Coulby, W. C. Richardson, William Gerlach, Edward Morton, W. A. Hawgood, John Mitchell, Silas Hitchcock and Capt. George P. McKay, was appointed to meet the body of Capt. W. W. Brown when it reaches Cleveland.

LAKE LUMBER TRADE.

Some very discouraging reports are being circulated regarding the lumber traffic of the lakes for the coming season. Probably the situation is not as blue as it is represented. No doubt the owners of lumber vessels, and especially those who are members of the Lumber Carriers' Association, are quite satisfied that no freight contracts should be made until well onto the opening of navigation. They know that they have suffered disadvantages in the past by the early scramble each year to make contracts for carrying lumber and that all interests are better served by first knowing what their costs are to be. From all that can be learned, the affairs of the Lumber Carriers' Association are in fact in better shape than they have ever been in the past, and if the plans outlined at the last annual meeting are carried out, which now seems quite certain, the lumber vessels will fare better than in other seasons, even if the movement of lumber is much reduced. The careful manner in which leaders in the association are making arrangements for the coming season's business is commendable. They are not disturbed by the fact that freight contracts are not being made, as there was a clear understanding at the annual meeting that no contracts of any kind should be made for association vessels until freights might be agreed upon in accordance with handling charges and other costs to the vessels. In the several districts where lumber handlers are employed in loading and unloading vessels under different conditions contracts are being made as fast as possible with the longshoremen, and it will be noted that in all these contracts the men and the vessel owners are agreeing upon conditions that are mutually beneficial. In fact the assistance to be rendered the association by the longshoremen must in many instances prove beneficial to the vessels. One feature of these agreements is that the wages accepted by the men are to apply only to vessels of the association. The men are to know vessels of the association by certificates of membership that will be issued to the vessels. At a conference in Manistee, a few days ago, between representatives of the association and delegates from the different unions at ports on Lakes Michigan and Huron the rate of wages for the full season at ports on those lakes was fixed at 52½ cents an hour. At Lake Superior ports the rate is to be 55 cents. The agreements entered into cover all the usual details of such contracts. Wage scales for unloading lumber at Cleveland, Buffalo and other Lake Erie ports have not as yet been fixed, and the association will take no action regarding freights until contracts are made with the workmen in these districts and there is a better understanding as to prices of fuel, etc.

SITUATION AT DULUTH.

Mr. G. A. Tomlinson, vessel agent, writing to Hutchinson & Co. of Cleveland of the conditions at Duluth, says:

"Thirty inches of ice in the bay, not any in the lake, describes the condition at this port. The weather for ten days has ruled extremely mild. The season is not quite as far advanced as a year ago, but the next fortnight will probably determine whether this harbor will be late or early in opening. In the local warehouses there are 11,000,000 bu. of grain; one year ago there were 15,000,000 bu. Receipts have averaged about 1,000,000 bu. weekly, but these will diminish, as country elevators have been shipping grain to avoid taxes, which attach Mar. 1. There is no market for vessel tonnage. Shippers assert they are unable to sell any cereals."

A Chicago dispatch announces that the Edward Hines Lumber Co. has been allowed to change the names of its steamers as follows: S. S. Wilhelm to L. L. Barth; Santa Maria to L. Edward Hines, and A. Folsom to Trude R. Wiehe.

NORTHWESTERN GRAIN SITUATION—DULUTH ITEMS.

Duluth, Minn., Mar. 4.—Grain stocks at the head of Lake Superior aggregate 11,000,000 bu., of which wheat forms just about half and flax one-third. Of oats there is about 1,000,000 bu. and the rest is barley and rye. Oats is being brought in in quantity for spring shipment by lake. The receipts of wheat and flax will be large this and next month, and the probability is that by the opening of navigation there will be 13,000,000 bu. of all grains here. There is no activity among shippers, though they are selling some Manitoba wheat for spring shipment. On the crop of 1902 there has been received at the head of the lakes 58,200,000 bu. grain, against 55,400,000 bu. for the same period of the preceding year. There has been shipped during the same periods 44,600,000 bu. this year and 42,700,000 bu. the year before; this notwithstanding that wheat occupies a lesser place this year than last, the increase in flax and other grains making up the difference.

Saw mills at the head of the lakes are turning out lumber rapidly, day and night, and there was never so much winter activity at mills as now. Five are at work. The daily receipts of logs by rail at mill docks of this city amount to about 2,000,000 ft., much of which is for immediate sawing.

The Canadian Pacific will erect at its lake terminus in Fort William one of the largest and most modern coal handling plants on the upper lakes. A contract for the work has been given the American Bridge Co. and Jas. Clarke, who has been in charge of the erection of similar plants in the lake copper country, will have charge of construction. The plant will be of steel throughout.

Engine crews of "second class" ships of the Pittsburg fleet in winter quarters at the head of Lake Superior have arrived and are now outfitting. Work on the first class ships is well along.

No steps have been taken this winter looking to the raising of the sunken Thos. Wilson, whaleback, wrecked last summer. It is generally believed that the purchasers of the vessel will do nothing, and that the wreck is again for sale. This, however, the Wielands, who apparently bought the ship, deny vigorously. Ice has not formed during the winter strong enough to permit of work on the vessel, and there is now no chance for freezing weather long enough to make ice.

Head of the lake coal docks will receive important and extensive additions the coming summer. The Northwestern Fuel Co. will complete the hard coal section of its new dock on the lower bay and will improve No. 2 dock by the rebuilding of 600 ft. of its length. The Pioneer and Ohio coal companies and the Boston Coal Dock & Wharf Co. will all improve their docks on the Duluth side of the bay, and there is good reason for expecting the erection of a large new dock on the Duluth side during the coming two years. The docks of the Philadelphia & Reading and St. Paul & Western, on the Superior side, will both be enlarged and rebuilt. Indications are for a banner coal movement during the coming season.

The government will for the first time do some work in Port Wing, Wis., the coming season. Port Wing has a saw mill and some other industries. The place is about 28 miles east of Duluth on the south shore of the lake. All previous work in the way of harbor improvements has been by the lumber companies interested there. A harbor there will be very convenient for small craft in stress of weather.

The Great Northern road is to build new shops and roundhouse at the ore docks, Superior, and will run the docks from a central electrical plant, to be installed this season. The new dock is well along and will probably be ready when it is wanted.

GENERAL STATISTICS OF LAKE COMMERCE.

Statistics of ore traffic on the great lakes, covered through railway reports, and the statistics of Lake Superior commerce, as reported through the canals at Sault Ste. Marie, are very reliable, and it is fortunate that we have even these measures of lake commerce as a whole, but as explained many times in these columns, it is impossible, in view of the customs regulations, to obtain a complete report of traffic throughout the entire chain of lakes. The treasury bureau of statistics has of late made an effort along this line, but its figures can not be accepted as complete with the assurance that attends the partial reports of lake commerce from the Sault and from the railways engaged in the ore trade. They are given for what they are worth. The treasury bureau reports that commerce on the lakes between domestic ports for the entire calendar year 1902 resulted in freight receipts amounting to 54,074,729 net tons, compared with 45,679,019 net tons for 1901. Iron ore and minerals constitute approximately half of this freight tonnage. In 1902 there were 27,898,424 tons of ore and minerals received at lake ports from domestic sources; in 1901, 20,770,447 gross tons. Coal contributed 8,256,117 net tons to the receipts of 1902, and 9,205,764 tons in 1901. The total figures for arrivals and clearances of vessels in the coasting trade on the great lakes

for 1902 are given in net registered tons as follows: Arrivals, 74,609,251 tons; clearances, 74,807,718 tons. The maximum movement occurred in August, when arrivals totaled 10,598,176 tons and clearances 10,848,384 tons.

CHICAGO NAUTICAL SCHOOL.

The fourth annual dinner of the Alumni Association of the Chicago Nautical School was held at the Hamilton club in Chicago, Feb. 24. Among those present were: F. E. Porter, late commodore Columbia Yacht Club; Henry A. Aranson, Capt. Fred D. Weimar, J. R. Lynn, Jr., W. H. Elliott, P. F. Edelhagen, Wells Egar, John J. Rossman, Capt. S. H. Walle, Capt. K. A. Jensen, Capt. J. F. Hansen, Capt. John K. Olsen, D. A. King, J. P. Erick, Capt. A. B. Swansen, Capt. J. E. Kohnert, F. B. Weaver, Judge G. W. Underwood, J. H. Sellen, F. T. Lindman, F. W. Humphrey, Lieut. J. E. Reinberg, revenue cutter service, C. S. Babcock, Judge Charles G. Neeley, Henry D. Hatch, W. J. Wilson.

The annual election of officers resulted as follows: President, W. D. Hamilton; vice-president, C. S. Babcock; treasurer, F. B. Weaver; directors, Capt. Travis, Lieut. E. R. Mason and F. E. Porter. Speeches were made, poems recited and a general good time was had. Lieut. Wilson reported that seventy-four pupils had taken one or more courses during the year and also that the prospects for the new course in engineering were extremely favorable. The alumni present resolved to double the attendance during the next year if possible. The meeting adjourned with three cheers for the school and for Lieut. Wilson.

AROUND THE GREAT LAKES.

Vessel men are expecting that hull insurance will be generally on about last year's basis.

Capt. Chas R. Ward, who was well known around the lakes in the days of sailing vessels, died in Detroit a few days ago.

Anna C. Minch is the name selected for the large freight steamer building at the Cleveland yard of the American Ship Building Co. for Henry Steinbrenner and others of Cleveland.

Gen. Supt. Ripley of the ship canal at Sault Ste. Marie estimates that 40,000,000 tons of freight will pass through the canals during the present year. This is 4,000,000 tons in excess of 1902.

It is announced from Buffalo that work is progressing favorably on the Inland Lloyds vessel register, which is to contain this year ratings and valuations for Canadian lake vessels as well as those of the United States, and that the book will be out on time.

The International Brotherhood of Steam Shovel & Dredge Engineers has become affiliated with the International Longshoremen, Marine & Transport Workers' Association. It is quite likely that the International Pile Drivers' Mutual Protective Association will also join the big general organization.

Taking the loss of the Bannockburn as the subject of their text, some of the Canadian newspapers are advocating load line legislation for the great lakes. The loss of such a vessel shows the trying conditions to which lake navigation is subject and the need of stringent laws to prevent overloading, sailing with insufficient crews or venturing out in an unseaworthy condition.

Negotiations are under way to include engineers who are not members of the Marine Engineers' Beneficial Association into an organization in affiliation with the International Longshoremen, Marine & Transport Workers' Association. Application for a charter for a Cleveland branch has been made and branches have already been organized at Detroit and Ashtabula.

Maj. J. G. Warren, United States engineer at Milwaukee, announces that before the end of the coming season the Marinette harbor work will have been completed as far as the present appropriations will permit. The project is being undertaken with a view to a harbor of refuge off the Twin Cities. At present the work consists chiefly of dredging the Menominee river to a uniform depth of 21 ft.

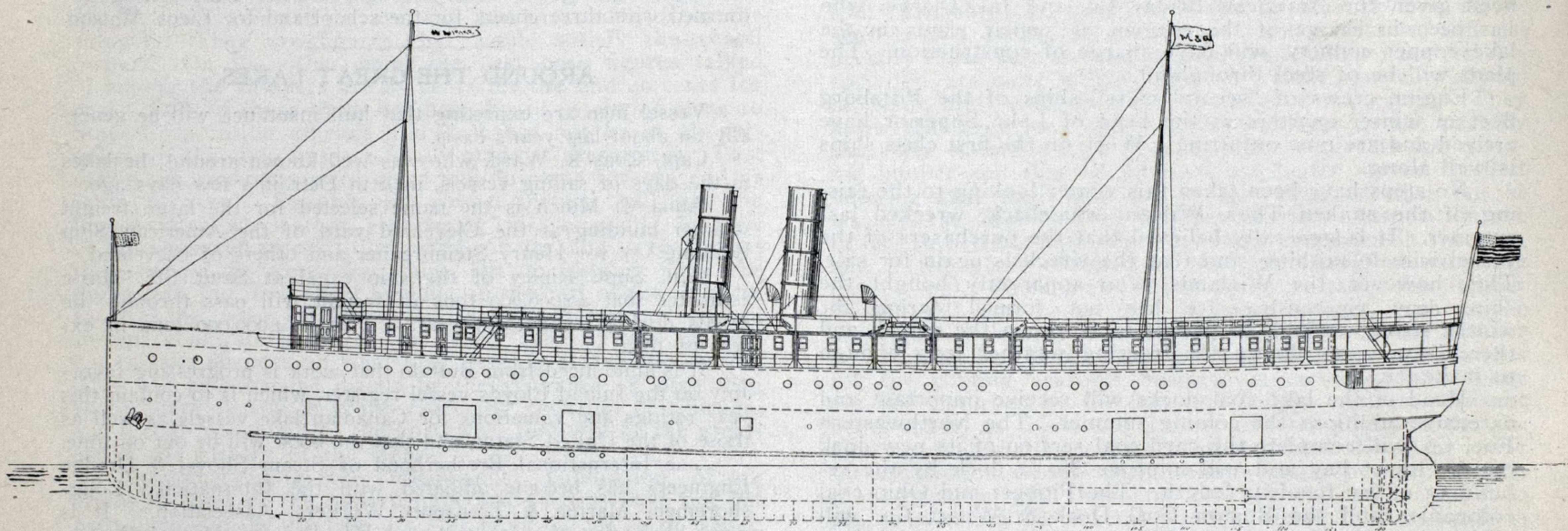
At the annual meeting of the stockholders of the Cleveland & Buffalo Transit Co., Tuesday, Mr. C. A. Harris was elected a director, making the number eight, instead of seven, as heretofore. The other directors elected were Messrs. M. A. Bradley, George W. Gardner, Harvey D. Goulder, D. Shurmer, R. C. Moody, George W. Avery and T. F. Newman. The directors will elect officers next week.

Mr. Edwin T. Douglas, assistant general manager of the Western Transit Co., has been appointed to take charge of the six steamers recently purchased by a syndicate of railways from the Northern Steamship Co. It is understood that no plan has, as yet, been formulated for the operation of the boats and that Mr. Douglas' appointment is to care for them while the organization is being perfected.

The steamer S. N. Parent, first of the three canal-size steamers building at Wyandotte for the Great Lakes & St. Lawrence Transportation Co., of which A. B. Wolvin of Duluth is general manager. This is launch No. 151 from the Wyandotte yard. Capt. J. A. Duncanson will sail the Parent. It is said that a very large business for next year has already been secured for the ten steamers of this kind building at different works of the American Ship Building Co. for the Great Lakes & St. Lawrence company.

NEW STEAMER FOR THE MICHIGAN STEAMSHIP CO.

In the new twin-screw passenger and freight steamer to be built for the Michigan Steamship Co. of South Haven, Mich., the Jenks Ship Building Co. of Port Huron has undertaken quite a task, as the vessel, although not large, is to be one of the finest of the great lakes. She is intended for the fruit trade between South Haven and Chicago but her appointments for passengers will be of the highest order. The new steamer is promised to go into commission on June 1, next. She will be 275 ft. over all, 265 ft. keel, 38 ft. beam and 22 ft. 8 in. molded depth. The depth of hold will be 10 ft. 9 in. The steamer will be fitted with a double bottom throughout and will be divided by five watertight bulkheads, so that her construction will be unusually strong. She will be equipped with two triple-expansion engines of 21, 34 and 56 in. cylinder diameters, with stroke of 30 in., to be supplied with steam from four Scotch boilers, 13 ft. 6 in. in diameter and 12 ft. 6 in. long, allowed a working pressure of 200 lbs. The indicated horse power is to be 3,500 and the vessel is designed for a speed of 20 miles per hour. She will have three steel decks. Her main and upper saloons will be finished throughout in mahogany in the most approved manner. The staterooms, of which there will be 100, will reach out flush to the side of the steamer, so that there will be no promenade as in most passenger vessels. However, there will be a house on top of the deck with promenade about it. The dining room will be forward in the main saloon and will be finished in quartered sawed



New Twin-Screw Passenger and Freight Steamer for the Michigan Steamship Co.

Building by Jenks Ship Building Co., Port Huron, Mich.

oak in contrast with mahogany. Abundance of light will be provided, in that the dining room will reach from side to side of the steamer and it will really be the most attractive and pleasantest part of the ship. The smoking room will be aft of the upper house, approached from the gallery, and the ladies' cabin will be on the saloon deck.

All freight will be carried in between decks. The steamer will be equipped with every convenience, including electric lights throughout, search light and running water in every stateroom.

NEW FREIGHTERS FOR THE MONTREAL TRANS. CO.

Kingston, Ont., Feb. 28.—Two new steel freighters for the grain trade are nearing completion at Wallsend, England, for the Montreal Transportation Co. They are to be christened Fairmount and Westmount and are practically duplicates, being of the following dimensions: Length, 248 ft. between perpendiculars; beam, 42 ft.; depth, 23 ft., molded. The engines will be triple-expansion with cylinders 21, 25 and 58 in. in diameter with stroke of 39 in. Steam will be supplied by two Scotch boilers, 13 ft. 9 in. in diameter and 10 ft. 3 in. long, allowed a working pressure of 180 lbs. They will be commanded by Capt. Alexander Milligan of St. Catharines and Capt. P. C. Telfer of Owen Sound. The Montreal Transportation Co. is also giving the steamer Glide an overhauling.

The dominion government boat Scout is being lengthened 30 ft. at Davis' yard. New engines are to be installed in her.

The Barry Line of Chicago is making preparations to touch at several of the smaller Green bay ports not now visited. An additional boat will run between Milwaukee, Manitowoc and Gladstone, and some of the east Green bay points will be visited on the northern run. Arrangements are being made for the purchase of new dockage on the Milwaukee river going several blocks further up the river than the other passenger lines for a dock. It is also announced that the Barry company will add the steamer City of Grand Rapids to the fleet of boats on the west shore route the coming season and that she will alternate with the steamers Badger State and Empire State in making trips to Menominee and Marinette.

CANADIAN MARITIME NEWS.

The steam barge Ringleader is being lengthened at Alexandria Bay. Capt. F. E. Wood is the owner.

The schooner Annie Falconer of Coburg, Ont., built in 1867, has been sold to Capt. Ackerman of Pictou, Ont.

M. Connolly of Montreal is negotiating in Toronto for a steamer to be placed on a route from Montreal to Gospe, Que.

The British Columbia Salvage Co. has purchased the steamer Maud, built in 1872, and will fit her up as a wrecking steamer.

The Halifax & Newfoundland Steamship Co. has been given an extension of its charter to enable it to do a general wrecking business.

There are under construction at Marlton's ship yard, Goderich, a steamer for the Dominion Fish Co. and two tugs for private owners.

Abbey Bros. of Owen Sound, Ont., have laid the keel for a 45-ft. tug, and are figuring on a 75-ft. tug for a lumber company on Georgian bay.

A branch of the Canadian National Association of Masters & Mates has been formed at Kingston, Ont. Capt. J. Dix is president, and Capt. G. Crawford is secretary-treasurer.

The local court of admiralty at Toronto has declined to approve of the recent sale of the steamer A. J. Tymon for \$4,500. There are claims against the steamer for \$11,000 for wages, of

which \$3,000 is due to Capt. McSherry, who is also one of the owners.

Capt. W. J. Doan, who has been engaged in the steamship business on the Pacific coast at San Francisco, Cal., and Victoria, B. C., since 1850, died at Victoria, Feb. 12, aged seventy-eight years.

The dominion government steamer Lady Laurier reached Halifax Feb. 22, making the run from Glasgow in a few hours over ten days. She is to be engaged in the lighthouse and cable repair branches of the service.

The dominion steamers Stanley and Minto are held fast in the ice in Northumberland strait and are not likely to be released before the ice breaks up. The Stanley has now been held six weeks and the Minto two weeks.

The Yarmouth Marine Railway Co. is applying for incorporation at the current session of the Nova Scotia legislature. It proposes to take over an existing marine railway at Yarmouth and to carry on a general ship building and repairing business.

The Montreal harbor commissioners are considering the question of erecting sheds and other permanent structures on the high level wharves. Wooden sheds are estimated to cost \$1,517,300, and steel sheds \$2,382,000. A special meeting is to be called to discuss the reports.

The Canadian Ship Building Co. has decided to locate its plant near Welland or Lake Erie. It is proposed to obtain all the power required for the works from Niagara Falls, the promoters of the company being interested in one of the power proposals there. This company will not be ready to begin building vessels until next year.

The Northern Navigation Co. of Ontario has decided to place a fourth steamer on the route between Sarnia and the head of Lake Superior, so as to provide for a service three times a week. The service will be maintained by the Huronic, Majestic, United Empire and Monarch. The Majestic will only go as far as Port Arthur, and not to Duluth, as the others will. In connection with this service the announcement is made by the Canadian Pacific Railway that the Northern Navigation Co.'s service will alternate with their service from Owen Sound, so that from the opening of navigation there will be a daily service to Port Arthur and Fort William.

FISHING INDUSTRY OF THE GREAT LAKES.

The great staples of the commercial fishing industry are whitefish, pike, herring, sturgeon and lake trout. They form the biggest catches and are always saleable. The chief source of supply of one or another of these staples is the great lakes and the lakes of the Canadian northwest. Lake Erie is one of the best fresh water fish producing bodies in the hands of the industry. One authority states that it produces nearly much tonnage of fish a year as all the other great lakes combined. That is not because there are more fish in Lake Erie but because it is fished more.

One of the most desirable taken from the waters of the great lakes is the whitefish. Lake Erie whitefish is the standard for all of that species. The quality of fish depends upon the nature of the water in which it is caught. There are probably a score of different kinds of fish known to commerce, the differentiation being in color and shape. If a whitefish from Lake Erie and one from Lake of the Woods were placed together, the ordinary observer wouldn't believe they were of the same family. The whitefish from the Lake of the Woods is black alongside the silver-sided denizen of Lake Erie. Those from Lake Winnipeg have a reddish tint. A glance at a whitefish will reveal to an expert the locality in which it was caught. But while the best whitefish come from Lake Erie, the main source of supply is from the Canadian lakes.

Most of the supply of lake trout is found in Georgian bay, Lake Huron and Lake Superior. There are practically no trout in Lake Erie, and there are none in the large Canadian lakes. A large supply of yellow pike and pickerel is caught in the Canadian lakes. Yellow pike is not abundant in Lake Erie, while blue pike is not found outside of Lakes Erie and Ontario. Lake Erie contains the larger supply. Many of the large catches of fish made in Lake Erie about Buffalo are of blue pike. The herring in Lake Erie are the standard of quality for all the other lakes, and are finer and better than any others. It is said to be the only kind of herring that closely resembles the whitefish. Its weight has increased lately, many of two pounds being caught. By the eye the large herring can scarcely be distinguished from the ordinary whitefish, but the flavor, of course, is not the same.

The development of the sturgeon as a great article of commerce is one of the most interesting stories connected with the fish industry. Just a few years ago sturgeon sold for 25 cents apiece. One female sturgeon sold for \$28 the other day. The value placed on the sturgeon for its eggs is familiar to all, but the flesh now, too, sells up with that of other staple fish. It brings 10 cents a pound fresh, while the smoked article sells at a much higher price. Smoked sturgeon is now considered one of the best fish delicacies on the market, and almost all of that caught is prepared in that way. The eggs of the sturgeon bring 50 cents a pound to the fisherman. They are made into caviar. The bladder sells for \$1 a pound, and is used for isinglass.

A fish regarded as a staple all over New York state is the bullhead. The chief commercial supply comes from Lake Ontario, although local fishermen sometimes add a little to it. The supply of eels also comes from Lake Ontario. It is said that eels never get into Lake Erie unless they lock themselves through the Welland canal. They are a migratory fish that come originally from the sea, and Niagara falls bars their passage into the upper lakes. It is said the eels are always propagated in salt water. Boatmen often report seeing millions of one and two-inch eels struggling up the swift waters of the St. Lawrence river on their way into Lake Ontario. While the eel, from its shape, is repugnant to many people, the demand for them is greater than the supply.

The much despised carp occupies a place on wholesalers' lists, but Americans haven't been educated up to its use as an article of food to any extent. These fat, slimy fish were imported from Germany by some well-meaning persons, but their propagation in the waters of the great lakes has proved a misfortune. They devour large quantities of the spawn of other and more valuable fish. At certain times of the year, when other fish are scarce, they command a fair price. In some places abroad carp is still considered a delicacy. One fish merchant says that carp were designed by nature to supply the wants of a people where water is scarce, for they can live in mud holes. Farmers in Germany raise them in very small ponds.

The black bass supply is very limited, especially on account of the Canadian laws, which prohibit their exportation from that country. Black bass bring from 16 to 18 cents a pound at retail, and the man who gets them at that price considers himself lucky. Fish retailers usually save black bass for their very best customers. Some black bass are caught in Lake Erie. The brook trout supply of New York comes principally from within its own borders, it is not a large supply and the fish retail at from 50 to 60 cents a pound. Canadian laws prohibit their exportation from that country, and the laws of surrounding states are also stringent. Catches of muscallonge are picked up here and there, but they are included among the game fish, and their supply is limited. Closed seasons and stringent exportation laws protect them.

Fresh fish is supplied all over the country winter and summer nowadays. In the summer time refrigerator cars take it to points remote from the fresh water lakes. In winter time

when lakes are covered with ice, the cold storage warehouses open their doors and send out fish that was caught in the summer months. Fishing through the ice also produces a small supply of fresh-caught fish in the winter time. This supply is increasing for winter fishing is now getting to be quite an industry on the lakes of the Canadian northwest, as well as on the great lakes.

MORE STEAMERS FOR CANADIAN LAKE TRADE.

The Canada Lake & Ocean Navigation Co., in which Mackenzie, Mann & Co. are largely interested, which operated the four turret type steamers on the upper lakes in 1902, has purchased three additional steamers, which will be placed in service at the opening of navigation next spring. The steamers will be operated from Port Arthur to Depot Harbor and other ports and will handle grain from the Canadian Northern Railway. At Depot Harbor the grain will be transhipped to the Canadian Atlantic Railway and carried to Hawkesbury, Ont., where it will be handed over to the Great Northern of Canada, in which Mackenzie, Mann & Co. have just purchased a controlling interest, and carried to Quebec for shipment to Europe. At Quebec Mackenzie, Mann & Co. will have choice of two routes to Europe, the first with the Leyland line of the International Mercantile Marine Co. of New York, with which the Great Northern Railway has a contract. The second line will be the three freight steamers recently purchased by W. F. Petersen of the Canada Lakes & Ocean Navigation Co. These steamers are to be employed in carrying steel rails from Antwerp and Rotterdam to Montreal and Quebec for Mackenzie, Mann & Co., and will be provided with return cargoes of grain.

APPOINTMENTS OF MASTERS AND ENGINEERS.

Canadian Pacific Railway Co., Owen Sound, Ont.: Steamers—Manitoba, Capt. E. B. Anderson, Engineer W. Lewis; Athabasca, Capt. Geo. McDougall, Engineer W. Lockerbie; Alberta, Capt. Jas. McAllister, Engineer A. Cameron.

Dunkley-Williams Co., S. Haven, Mich.: Steamers—City of Kalamazoo, Capt. B. A. Cross, Engineer C. H. Wilcox; H. W. Williams, Capt. F. W. Swails, Engineer R. Peterson; City of South Haven, Capt. J. M. Mitchell, Engineer C. LaBounty.

Lake Michigan & Lake Superior Trans. Co., Chicago: Steamers—Peerless, Capt. H. C. Page, Engineer John R. Bennett; City of Traverse, Capt. ———, Engineer Edward Meeh; Jay Gould, Capt. Chas. Wilson, Engineer Henry Chalk; Osceola, Capt. Jos. White, Engineer J. M. Oag.

McBrier, James, Erie, Pa.: Steamers—Nyanza, Capt. C. H. Wilson, Jr., Engineer W. J. McDonald; Sevona, Capt. D. S. McDonald, Engineer Geo. E. Averill.

Manitou Steamship Co., N. F. Leopold, Pres't., Chicago: Steamer—Manitou, Capt. Allan McIntyre, Engineer Roy L. Peck.

Northwestern Transportation Co., L. C. Waldo, Mgr., Detroit: Steamers—Harvey H. Brown, Capt. David Girardin, Engineer L. M. Peck; Fayette Brown, Capt. Jos. A. Powell, Engineer Nicklas Anderson; S. R. Kirby, Capt. John F. Jones, Engineer C. E. Collins. Schooner—Geo. E. Hartnell, Capt. C. L. Allen.

Olga Transportation Co., E. G. Riesterer, Mgr., Tonawanda, N. Y.: Steamer—John C. Pringle, Capt. Louis Young, Engineer Allen Becker. Schooners—Sweetheart, Capt. Philip Hepner; Unadilla, Capt. John Radigan.

Richardson Trans. Co., W. C. Richardson, Mgr., Cleveland: Steamers—W. C. Richardson, Capt. Thos. Wilford, Engineer James Falconer; Roumania, Capt. Wm. Hagen, Engineer Lawrence Regan.

Richardson, W. C., Mgr., Jackson Transit Co., Cleveland: Steamer—Samuel Mitchell, Capt. John H. Babbitt, Engineer A. C. Bowen. Schooner—Chickamauga, Capt. H. W. Phillips.

Richardson, W. C., Mgr., Duluth & Atlantic Trans. Co., Cleveland: Steamer—Iron King, Capt. Thos. J. Brady, Engineer ———. Schooner—Iron Queen, Capt. Thos. Fitzsimmons.

Richardson, W. C., Cleveland: Steamers—J. H. Wade, Capt. Richard Call, Engineer John McMonagle; J. H. Devereux, Capt. C. C. Mason, Engineer Thos. Shannon; Iroquois, Capt. E. J. Burke, Engineer L. L. Bowen; J. H. Outhwaite, Capt. Ralph Nutting, Engineer Oscar E. Flewelling. Schooners—Crete, Capt. A. Snelgrove; Mary B. Mitchell, Capt. John McKeighan.

Roby Trans. Co., L. C. Waldo, Mgr., Detroit: Steamer—L. C. Waldo, Capt. John Duddleson, Engineer N. E. Allen.

Frank Seither, No. 11 Joseph st., Cleveland: Steamer—V. H. Ketchum, Capt. M. J. Yipe, Engineer John Booth.

Seither Transit Co., Frank Seither, Pres't., No. 11 Joseph st., Cleveland: Steamer—G. J. Grammer, Capt. R. W. England, Engineer Geo. B. Milne.

West Division Steamship Co., D. Sullivan & Co., Mgrs., Chicago: Steamers—Fred Pabst, Capt. D. C. Sullivan, Engineer J. R. Mason; W. H. Wolf, Capt. Wm. Lund, Engineer Jno. A. McCaffrey. Schooner—Armenia, Capt. M. Dennis.

It is reported from Ashtabula that what is known as the Haskell dock at that place is to be entirely remodeled at a cost of about \$125,000.

PROPOSED MARITIME TREATIES.

The Maritime Law Association of the United States is sending out a request to various commercial and maritime authorities seeking information to present to the government when the two proposed treaties approved at the Hamburg conference come up for consideration. Robert D. Benedict is president of the association and Lawrence Kneeland of No. 44 Pine street, New York, is secretary. The executive committee comprises Addison Brown, Harrington Putnam and Frederic Dodge. In its request for information the committee says:

"In 1897 there was formed at Brussels the International Maritime Committee, whose purpose was, if possible, to effect a unification of maritime law in the interest and aid of international commerce and shipping. This committee has subsequently held four conferences, the first at Antwerp in 1898, the second at London in 1899, the third at Paris in 1900, and the fourth at Hamburg in 1902. Associations and committees have been formed and have been working with the same object in view in various countries, especially in England, Belgium, France, Germany, Holland, Norway, Sweden and Japan, while in this country the Maritime Law Association of the United States has taken up the subject. This association has appointed delegates to the various conferences of the International Maritime Committee, and has been represented at them all except at Antwerp in 1898, the year of our war with Spain. Various questions of maritime law have been discussed at these meetings, and in 1900 at Paris, upon the suggestion of Lord Alverstone, now lord chief justice of England, a sub-committee was appointed to draft treaties embodying proposed international codes on collisions at sea and salvage. This sub-committee met in London in April, 1900, at the royal courts of justice, under the presidency of Lord Alverstone, and drafted two such treaties. Those drafts were in turn considered and approved, with some unimportant changes, by the Hamburg conference in 1902, and a recommendation was there made that the executive council take steps to make the committee's work effective by securing the sanction of the various governments, so as to give to these codes the force of law."

The text of the two treaties proposed by the Hamburg conference are appended by the committee and are commented upon as follows:

"Should they be adopted by and become the law of the United States, important changes in the existing law would be effected, in that thereafter

(a)—All losses arising out of collisions due to fault on the part of both vessels would be subject to be recompensed by the ships according to the degree of fault which the court should charge against each.

(b)—There would exist no joint liability of the vessels in fault for losses of cargo owners or passengers, but each vessel would be liable for its proportion only of such losses; and a vessel sued by virtue of a contract of affreightment or carriage for damage caused by collision could, by proving the fault and degree of fault of the other vessel, free itself proportionately from its liability under the contract.

"The result would be that cargo owners or passengers would not be entirely compensated for their losses, where both vessels were in fault, if either vessel were totally lost, or if the value of either were not equal to the share of the damage for which it was adjudged liable.

"Under the existing law in the United States the whole damage can be recovered from either or both of the vessels at fault, and where both vessels are before the court the damages have been equally divided, irrespective of the degree of fault of each.

(c)—A sea-going ship in tow would be responsible to third parties for damages resulting from the faults of a tug in its service.

"At present the ship is not responsible for such a fault, as the tug is held to be an independent contractor and not a servant.

(d)—A vessel in collision which failed to render needed assistance to the other vessel, would not be presumed, by reason of such failure, to have been in fault in the collision, which is contrary to a statute of the United States, whereby from failure to render such assistance fault is presumed.

"This matter is likely soon to come before our government, and in order that the Maritime Law Association may be in a position to offer such suggestions to the government at the proper time as may seem advisable, it is desirous of ascertaining the views of the various maritime and business interests of the United States, and with that end in view has appointed the above-mentioned committee.

"Pursuant to this action, the committee request your views upon the subject matter as above set forth. This committee will gladly give such further information as may be in their power, if desired, and earnestly asks your co-operation in this important matter."

REAR-ADMIRAL CROWNINSHIELD RETIRES.

It was Emerson who said that men are but children of a larger growth, and while he intended that it should have application to mankind in general it has a special aptitude when applied to the navy department; for it is especially true that they are moved by circumstances and influences which appear childish to the ordinary business man. Rear-Admiral A. Crowninshield has resigned because his flagship, the battleship *Illinois*, was taken away from him. Crowninshield was, until he was assigned to the European squadron, the chief of the bureau of navigation, and had much to do with the movement and utilization of vessels during the late war with Spain. He was especially leaned upon by the late President McKinley and appeared to be a man with an equal capacity for dispatching work and for making enemies. In Washington during the war with Spain he was as little liked as any man could well be, and his general reputation of eating a newspaper man every morning for breakfast. During the maneuvers in the Caribbean sea the general board of the navy decided to form a formidable squadron of battleships for service on the Atlantic coast, similar to the famous British channel squadron which is England's first wall of defense and in an entirely impersonal way the *Illinois* was withdrawn from the European squadron for duty in the Atlantic squadron. Rear-Admiral Crowninshield was assigned to the cruiser *Chicago*. He protested against transferring his flag to the *Chicago*, which is, of course, a vastly inferior vessel to the *Illinois*. The protest was carefully considered but it was decided to adhere to the original plan and Crowninshield promptly asked to be retired. His desire to retire has been acquiesced in and Rear-Admiral Charles S. Cotton, commandant of the navy yard at Norfolk, has been assigned to succeed him.

SHIP YARD NOTES.

It is reported that the R. M. Spedden Ship Building Co. of Baltimore, Md., is negotiating for a site near Hampton Roads for a ship yard.

The Portland Ship Building Co., Portland, Me., is to build the hulls of two towboats for the Commercial Towboat Co. of Boston. The hulls will cost about \$9,000 each.

Dunn, Elliot & Co., Thomaston, Me., will shortly lay the keel for a three-masted wooden schooner of the following dimensions: Length of keel, 140 ft.; beam, 33 ft.; depth, 10 ft.

Crawford & Reid, Tacoma, Wash., are to build a new passenger steamer for Kunkler & Franks, Seattle, Wash. The Puget Sound Dry Dock & Machine Works will supply the engines.

Crowell & Thurlow, Boston, have contracted with Cobb, Butler & Co., Rockland, Me., for a four-masted wooden schooner with a carrying capacity of 2,600 tons. The new vessel will be 210 ft. keel, 43 ft. beam and 24 ft. deep.

The Baltimore Ship Building & Dry Dock Co. is laying the keel blocks and is shaping the frame for the twin-screw lighthouse tender *Magnolia*. This company is also the lowest bidder for the *Ivy*, a duplicate of the *Magnolia*, and it is expected that it will get the contract.

The M. A. Sweeney Ship Yard & Foundry Co., Jeffersonville, Ind., is understood to have purchased a site in West Bainbridge, Ga., on which it will locate a branch ship yard and will in the next few months construct eight boats for the United States government for use on the Chattahoochee river.

The Spedden Ship Building Co., Baltimore, Md., launched the lighthouse tender *Juniper* last week. She is one of the smallest tenders in the service, being intended for the shallow waters of the Carolina sound and rivers. She is 95 ft. 4 in. long, 18 ft. beam and 8 ft. 1 in. deep from deck. Her displacement is 108 tons.

The Portland Ship Building Co., Portland, Me., is to build the hull of a steamer for the Sebago Lake, Songo Lock & Bay of Naples Inn Co., for service on Sebago lake. The steamer will be 60 ft. long, 15 ft. wide and 4 ft. deep. The hull will be constructed of steel. The ship building company is also building a steamer for the Portland & Rockland route of the following dimensions: Length, 187 ft.; beam, 27 ft.; depth, 11 ft. She will be equipped with a triple-expansion engine of 800 H. P.

Officials of the Steel Corporation are evidently satisfied to allow a large part of their ore to be carried by the so-called individual vessel owners and get along, for the present at least, without building or acquiring additional vessel property. Only a very small part—a couple of hundred thousand dollars—of the thirty-six millions to be expended at once by the corporation for additions and improvements in its properties goes to the lake fleet, and even this small expenditure may be regarded as for maintenance.

Perfect Passenger Service.—Every comfort afforded by the highest grade of modern train service is secured by travelers via the Nickel Plate road and its connections on the semi-weekly trans-continental tours, with berth rates less than one-half the price of regular Pullman car service. Call on nearest agent. E. A. Akers, C. P. & T. A., Cleveland, O.

THE TRENT VALLEY WATERWAY.

By R. B. Rogers C. E., Chief Engineer, Trent Canal.

The term "Trent canal" is applied to a projected waterway for barges through central Ontario, to connect Georgian bay, on Lake Huron, with Lake Ontario, at Trenton, the head of the Bay of Quinte. The distance between these two lakes by the proposed route is about 200 miles. Where canalizing is necessary the prism has a width of 50 ft. on the bottom, with side slopes of 2 to 1 in earth, and $\frac{1}{4}$ to 1 in rock. The locks are 134 ft. in length by 33 ft. in width. The depth of water at present over the sills is 6 ft., but all the works are being constructed so that a draught of 8 ft. can be obtained at very little extra expense. The capacity of barges drawing 8 ft. will be about 800 tons. The water supply is obtained from an immense system of lakes to the north, most of which have regulating dams at their outlets. It is a misnomer to call it a canal, as out of the whole distance of 200 miles not more than 15 or 20 miles will be actual canal—in the remaining part the beautiful lake and river stretches are utilized for the navigable channel. The general line of this canal was that chosen by the imperial government for the purpose of opening up a transportation route between the great lakes as far back as the year 1825. Large sums of money were spent by the imperial government in opening up this route—in fact the imperial government actually voted a sufficient sum to complete the route as far as Balsam lake, but immediately after they had done so the McKenzie rebellion broke out, and the money thus voted was appropriated to quell the rebellion.

Every advantage was taken of the natural features of the river, and the land lying along the route, in order to reach a navigable channel, either by canalizing the river or making flooded reaches. The river with its high rocky banks, from its entrance into the Bay of Quinte at Trenton as far as Frankford, it was proposed to canalize by a system of dams and locks, of which there will be seven, by which means a beautiful, wide and deep navigable channel will be obtained. The route then passes through the river for about 4 miles to Chisholms Rapid lock. This lock is of masonry, and was built about seventy years ago, but is still in good condition. The route still passes through the river to a point known as Hoard's creek. From Frankford to Hoard's is at present navigable. From this point it is proposed to strike across the country for a distance of 10 miles to Crow bay. A greater part of this section will be flooded reaches. From its entrance into Crow bay the route crosses Crow bay to the river below Heeley's falls. It is proposed to canalize part of this river as far as the falls, and to surmount the falls with an hydraulic lift for a height of 53 ft. This brings us into a navigable reach of about 54 miles, at the north end of which is the town of Peterborough. This stretch includes 14 miles of river navigation as far as Hastings, where there is a masonry lock and dam built by the imperial government. The route still follows the river for about 6 miles, and then about 12 miles through the beautiful Rice lake, and then about 22 miles of as fine river navigation as can be found in any part of Canada to the town of Peterborough, where there is another masonry lock which was built by the imperial government. From this point the route stretches across the country to Nassau, on the river Otonabee, a distance of about 4 miles. The difference in level between these two points is 78 ft. which is overcome by means of an hydraulic lock, of 65 ft., and an ordinary lock of 13 ft. About two-thirds of this section is a flooded reach. From Nassau to Lakefield—a distance of about $5\frac{1}{2}$ miles—the river is canalized by means of five locks and dams. The section from Peterborough to Lakefield is all completed with the exception of the steel superstructure of the hydraulic lock, which is, however, under construction, and it is expected will be completed about the middle of the coming summer.

From Lakefield the route passes through a succession of beautiful lakes to the entrance of the canal at Balsam lake, a distance of about 65 miles. The lakes passed through are Katchewanoe, Clear, Stony, Lovesick, Deer, Buckhorn, Pigeon, Sturgeon, Cameron and Balsam. The difference in level between Lakefield and Balsam lake is about 85 ft. which is overcome by nine locks which are generally placed between the different lakes. From Balsam lake the route strikes across the country for about 5 miles on a level stretch, when it drops 50 ft. into the valley of the Talbot river by means of an hydraulic lock. From this point the route follows the valley of the Talbot river—which is raised some 21 ft.—to about the boundary between the townships of Eldon and Thorah. At this point a succession of five locks are met with, which brings us to the level of Lake Simcoe, at a point about 3 miles north of Beaverton. The sections between Balsam lake and Lake Simcoe are under contract, and will be completed next year. The route then passes through Lake Simcoe and Lake Couchiching, which are of course navigable, and it will either pass across the country to Matchedash bay or Georgian bay, a distance of 13 miles, or follow the river Severn to its entrance into Georgian bay.

All the structures recently constructed are built of concrete. No more suitable material for the construction of locks and dams could be wished for. The locks are of the ordinary type, with the exception of the hydraulic locks. The valves for filling and emptying the locks are placed in the gates. The apparatus for opening and closing the gates consists of a stiff steel beam fast-

ened to the top of the gate. To either end of this beam is fastened the ends of a wire cable which passes around the corrugated drum of a capstan which is let into a void below the coping of the lock. Tile drains, encased in stone, are placed below the floor and at different levels at the back of the lock walls, in order to relieve the floors and walls of any hydraulic pressure that might arise. The hollow quoins are lined with cast-iron in order to make a smooth surface against which the gates may work. The gates are of the solid timber pattern. Owing to the great amount of lockage to be overcome hydraulic locks were introduced in order to save time. The smaller streams are carried below the prism of the canal where necessary by means of pipe culverts, and the larger streams by concrete culverts. Where at all possible the highways and railways are carried across the canal on high level bridges, which it is proposed in future to construct wholly of concrete. The head room allowed below the bridge to the surface of the water is 25 ft. Where it is not convenient to use high level bridges the highways are carried across the canal on steel swing bridges—the abutments and piers of which are of concrete. The first dams constructed were of timber with a wall or "cut off" of concrete on the upper side. Stop log openings are left in the dam in order to be able to regulate the spring freshets, which sometimes rise to ten times the ordinary flow. A timber slide is left in each dam for the passage of sawlogs and timber. All dams at the present time are built wholly of concrete.

A short description of the hydraulic lock at Peterborough may be interesting. There are two watertight steel boxes, or chambers, 33 ft. in width by 140 ft. in length, with 8 ft. of water in the clear, and closed at the ends by means of gates hung on the lower edge. Similar gates also close the ends of the reaches. These chambers are carried by means of heavy trusses supported on top of two rams 7 ft. 6 in. in diameter, which work in two steel watertight presses, one under each chamber. The presses are connected with each other by a pipe 12 in. in diameter, in the center of which a valve is placed for the purpose of regulating the motion of the chambers. For the purpose of making up for the small quantity of water lost in the working of the main press an accumulator is installed in one of the side towers. This accumulator has a ram 20 in. in diameter, with a stroke of 30 ft. 6 in., working at a pressure slightly greater than that of the main presses. Its pressure is also utilized to operate the gates, capstans and small pumps. The junction between the ends of the movable superstructure and the ends of the reaches is made watertight by means of a continuous rubber hose, placed on the outer side of the ends and bottom of the gate of the reach. This hose is inflated with compressed air from a Taylor air compressor installed in the main wall.

The mode of operating the lock is as follows: Supposing both chambers are at a standstill, one up and the other down, both gates towards the reach open ready for the vessel to enter. When the chambers are thus, the bottom of the upper chamber will be about 10 in. lower than the bottom of the canal above, and has say 8 ft. 10 in. of water on the sill. The bottom of the lower chamber will be just level with the bottom of the canal below, and will have 8 ft. of water on the sill. Thus the upper chamber has 10 in. more water in it than the lower chamber, and consequently is so much heavier than the lower one (approximately 100 tons.) The valve in the connecting pipe between the two presses is closed. When it is desired to operate the lock gates at the end of each chamber, and the gates at the ends of the reaches are closed, the air is allowed to escape from the air hose—making the watertight seal between the lock and the end of the reach—and the operator, who stands in his cabin on the top of the central tower, opens the valve in the connecting pipe between the presses. The upper chamber then commences to descend and the lower chamber to ascend till both chambers reach their new positions, the upper chamber being now level with the lower reach, and the former lower chamber being opposite the upper reach. The operator now closes the main valve in the connecting pipe, and inflates the air hose forming the watertight seal at the end of the lock. When the chambers are in their new positions, the surface of the water in the lower chamber is 10 in. above the surface of the water in the reach below, and the surface of the water in the upper chamber 10 in. below the surface of the water in the reach above. Communication between the water in the chambers and the reaches is now made by opening the valves in the gates nearest the reaches, and the water in each chamber is allowed to find its own level. The gates are then opened. When this is done the chambers are then in the condition they were on starting. Vessels are hauled in and out of the chambers by means of hydraulic capstans. The time allowed to lock and pass one or two vessels in and out of the lock will be from twelve to fifteen minutes. The time required to raise or lower the lock chambers will be about three minutes. On the up stream side of the lock a guard gate will be placed which will be operated by hydraulic power, and will be closed when the vessel enters the lock. The substructure of the hydraulic lock is built of concrete. The natural surface of the limestone is at such an elevation that very little expense is necessary for the finishing of the floors at the lower reach level. The main retaining wall, 126 ft. long by 40 ft. thick, rests upon the limestone formation. Its height will be about 83 ft. The sides are carried up plumb for their whole height, the bearing pressure upon the rock being only about 6 tons per square foot.

BURDENSOME TASK OF GREATER SPEED.

[From the Engineer, London.]

The admiralty committee on subsidies to mercantile cruisers has just issued its report, which shows, on the authority of our highest experts in naval architecture, the onerous conditions to be fulfilled if any notable increase of speed is to be maintained over a long voyage, taken in the report as about 3,000 miles on the Atlantic passage. But so long as the Germans hold the flag for the fastest vessel, even under the arduous conditions of an extra day to Hamburg or Bremen, the *ne plus ultra* of steam navigation cannot be said to be reached. As in 1894, when rumors appeared of the new Cunard vessels, materializing in the Campania and Lucania, so now we read of the negotiations between the admiralty and the Cunard company for two new vessels, to have a contract sustained sea speed of 25 knots for the Atlantic passage. The plans are under consideration by the admiralty and chief constructor at the present time, but all the information relating to size that has leaked out states that the Clyde must be deepened before the vessels can be put in hand or launched, showing that they must run to much larger dimensions than the Campania and Lucania. As a matter of fact they will not be built on the Clyde at all.

The report of the admiralty committee is issued in popular language, for the edification of ordinary naval opinion; the theory and calculations are not given on which the conclusions are based; but the tabular statement issued in the report contains sufficient information on which to base some calculations and to reconstruct the theory. The length of the voyage being taken is 3,000 sea miles, the table shows the prime cost and engine power for speeds ranging from 20 to 26 knots, with the annual subsidy based on the present rules of allowance.

Speed in knots.	Prime cost. £	Horse power. I. H. P.	Annual subsidy. £
20	350,000	19,000	9,000
21	400,000	22,000	19,500
22	470,000	25,500	40,500
23	575,000	30,000	67,500
24	850,000	40,000	110,500
25	1,000,000	52,000	149,000
26	1,250,000	68,000	204,000

An analysis of these figures shows at once that the prime cost has been reckoned on the basis of the horse power at about £19 to £20 per horse power; also that the horse power has been proportioned to the fifth power of the speed, and not to the seventh power, as in Froude's law of mechanical similitude. This shows that the committee is taking a sanguine view of possible improvements in the steam engine not yet accomplished, and also that all available space in the swift vessels will be taken up with coal and machinery. The larger vessels are to be run at a higher speed than in accordance with Froude's law, reversing the plan adopted with the Oceanic, which has a lower proportionate speed.

Limitations of the depth of water at the ports of arrival and departure prevent the naval architect from utilizing to its full extent the most profitable extension of dimension in increase of draught in the large vessel; but for the sake of argument we may assume that considerations of seaworthiness will not cause any other material change in similarity of form, and now this similarity, combined with the working assumption of a resistance varying as the wetted surface and square of the speed (*pace* Mr. Mansel) shows that the committee have made the displacement proportional to the cube of the speed, and not to the sixth power, as in Froude's law; this makes the length of similar vessels proportional to the speed, so that the 600-ft., 20-knot steamer will stretch to 780 ft. for 26-knot speed. It is difficult to arrive at the displacement tonnage of a mercantile steamer, as a liberal discount is made to arrive at the registered tonnage, which is the basis of taxation and dock dues. But it cannot be far wrong to assume a displacement of 13,000 tons in the 600-ft. steamer at the commencement of the voyage, and this will be raised to 28,500 tons in the 780-ft. 26-knot vessel. The coal, reckoned at 1.75 lbs. per horse power hour, is raised from 2,228 tons to 6,131 tons, and the coal per hour from 15 tons to 52 tons. If Froude's law of mechanical similitude is preserved, it is found that the resistance, reckoned in pounds per ton, in railway fashion or in equivalent incline, is the same for all sizes, and works out to about 20 lbs. per ton, or an incline of 1 in 112 for the 20-knot vessel, taking the formula resistance in pounds per ton = 326 times the horse power divided by the displacement tonnage and the speed in knots. But with the law adopted by the committee the resistance in pounds per ton grows proportionately with the speed up to 26 lbs. per ton for the 26-knot vessel.

If the pitch of the propeller is 25 ft. in the 20-knot vessel, it will have to make 80 revolutions per minute; and these revolutions will have to be maintained throughout if the vessels are fitted with similar propellers. Steam pressure will require to be increased as the square of the speed from, say, 150 lbs. to 254 lbs. per square inch; on Froude's law the pressure would increase as the speed.

A tabular statement is appended of the calculations, which shows what the committee are confident naval architects and engineers can accomplish, if given a free hand, culminating in a

vessel, say, 800 ft. long and 28,500 tons displacement, with coal capacity of over 6,000 tons—sufficient to drive it at 26 knots over a voyage of 3,000 miles. But any re-arrangement which would shorten the voyage, say, 500 miles, by choosing a Canadian and Irish port, would render the condition of speed far less onerous to fulfill.

Speed, in knots . . .	20	21	22	23	24	25	26
Time of voyage, chron. hours	150	143	136	130	125	120	115.5
Prime cost . . . £	350,000	400,000	470,000	575,000	850,000	1,000,000	1,250,000
Horse-power, 1HP	19,000	22,000	25,500	30,000	40,000	52,000	68,000
Annual subsidy £	9,000	19,500	40,500	67,500	110,500	149,000	204,000
Length, in feet . . .	600	630	660	690	720	750	780
Displacement, tonnage	13,000	15,000	17,300	19,800	22,400	25,400	28,500
Coal (at 1.75 lbs. per H.P. hour), tons	2,228	2,456	2,912	2,058	3,900	4,876	6,131
Coal, in tons per hour	15						52
Resistance, in pounds per ton . .	20	21	22	23	24	25	26
Equivalent incline, one in	112	103	102	198		90	86
Steam pressure, lbs per square inch . .	150	165	181		216	234	254
Machinery department, number . .	100	110	125	150	200	260	340

How is it, then, that the Germans can beat us, handicapped as they are by an extra day's steam? Do they coal up at Southampton or Cherbourg? And what is the basis on which the sea speed is reckoned?

The actual chronometric hours of the westward passage are subjected to a deduction of four hours and a half, due to longitude difference; if this discount is made, the apparent sea speed of the 26-knot vessel is raised to 27 knots. The problems of the Atlantic passage are not the only ones requiring solution; South Africa demands a rapid steamship service, available in time, we hope, for the projected visit of the British Association in 1905. But if an Atlantic steamer is put upon this passage of double length, a reduction in sustained sea speed of over 30 per cent. must be anticipated. At the Dusseldorf exhibition, in the Krupp annex, a very fine piece of steel work was shown in the shafting of one of the two propellers of the North German Lloyd Kaiser Wilhelm II. The shaft was 283 ft. long, weighed 226 tons, and was provided with six cranks, arranged so as to avoid vibration, on the Schlick system, and actuated by eight cylinders, two steepled. Thus the vessel will be provided with four complete sets of four-cylinder engines. A sleeve in the shaft was shown, to serve in case the shaft was broken at sea; unfortunately, the fracture takes place too often in an inaccessible part.

The Parson turbine has been running with success for the past two years in the Clyde Union steamers King Edward and Queen Alexandra. It is rumored that an order has been placed for a turbine steamer to make the Newhaven-Dieppe passage of 60 miles in two hours and bring this route to the front as the quickest route to Paris. A similar vessel would knock off only 20 miles from the Dover-Calais passage. But to retain command of the ocean we must bestir ourselves, and shake off the lethargy in which we were discovered in the last century.

NEW YORK HARBOR NOTES.

Members of the maritime exchange of the metropolis take exception to several bills introduced in congress recently to give American register to certain foreign-built vessels. They succeeded, a few days ago, in passing a resolution against the admission of such vessels, except in strict accordance with fixed law on the subject, no matter what reasons may be advanced in favor of special acts for registry. The resolution declares that the association is opposed to the granting of American registry to any foreign-built vessels whatsoever, except those captured in war, forfeited to the United States for violation of our laws, or wrecked in American waters and repaired in American ship yards at three-quarters of their cost, when repaired. "That such a resolution did not pass by a unanimous vote," says a correspondent's note on the subject, "is to be inferred from the fact that there are members of the exchange who are interested in such vessels, and who believe in, and act on the adage that 'half a loaf is better than no bread.' And it is to be expected that they will continue to act on this theory by investing their money in such vessels as long as the present United States laws regulating such matters remain in force, and the cost of building ships here exceeds that in foreign countries, as attested by words and acts of members of the exchange."

The fine steam yacht Clermont, under the chaperonage of the Hudson River Day Line, Desbrosses street pier, New York city, is offered for sale or charter the coming season. She goes into commission in May. Capt. C. B. Howell, formerly commander of the yacht Safa-el-Bahr for Mr. Charles M. Schwab, has just been secured to take charge of the Claremont. She ranks among the most attractive and desirable yachts offered for charter or sale.

Among the charterers of the Claremont during the past three years are Mr. W. B. Leeds, Mr. Henry W. Cannon and the Hon. Wm. C. Whitney, all of whom attest to her comfort, speed and general satisfaction.

COMPARATIVE STRENGTH OF NAVAL POWERS.

An interesting comparison of the navies of the principal powers of the world has been made by Capt. Sigsbee, chief intelligence officer. It appears that the United States has in its navy 109 vessels of 278,259 tons and is building forty-four of 300,484 tons. The existing fleet consists of ten first-class battleships, 112,329 tons; ten other battleships and coast defense iron-clads, 41,002 tons; two armored cruisers, 17,415 tons; two first-class protected cruisers of 14,750 tons; twelve second-class protected cruisers of 47,100 tons; twenty-three unprotected and partially protected cruisers of 32,111 tons; six gunboats, 4,020 tons; twelve torpedo boat destroyers, 5,259 tons; twenty-five first-class torpedo boats, 3,913 tons; six second-class torpedo boats, 285 tons; and one submarine of 75 tons displacement. The vessels building are nine first-class battleships, aggregating 131,200 tons; two other battleships and coast-defense vessels of 6,428 tons; eight armored cruisers, 111,800 tons; three first-class protected cruisers of 28,880 tons; six second-class protected cruisers, 18,600 tons; four destroyers, 1,620 tons; five first-class torpedo boats of 1,116 tons, and seven submarines of 840 tons. We are building no unprotected cruisers, no gunboats and no second-class torpedo boats. The increased size of our naval vessels is clearly shown by the fact that, though the vessels built outnumber those building in the proportion of five to two, the tonnage of the latter is to that of the former as fifteen is to fourteen.

Only two of the great naval powers, France and Great Britain, in the order named, exceed us in the number of vessels building, and Great Britain alone surpasses us in tonnage of vessels building. Her figures are: Vessels built, 546, of 1,401,018 tons; vessels building, seventy-eight, of 406,856 tons. She is building eleven first-class battleships of 167,750 tons, and twenty armored cruisers of a displacement of 205,700 tons. The remaining forty-seven vessels now under construction are comparatively small, most of them being destroyers and nine submarines.

France, the second naval power of the world, has 370 ships afloat of 590,942 tons, and is building eighty-three of 213,332 tons. Of these six are first-class battleships, 87,780 tons, and ten are armored cruisers, 110,546 tons. Forty-four are destroyers and torpedo boats and twenty-two are submarines. These latter, when finished, will give to France a total of thirty-four against eight in our navy and nine in the British navy.

Germany, with 205 vessels built, of a displacement of 382,715 tons, is building twenty ships only—five first-class battleships, of 62,779 tons; two armored cruisers, of 18,238 tons; one second-class protected cruiser, 3,250 tons; five unprotected cruisers, 13,446 tons; one gunboat, 900 tons, and six destroyers, 2,100 tons, a total of 100,713 tons under construction. She has now nine battleships of 100,969 tons displacement.

Italy is building fifteen ships of 97,057 tons, to add to her 200 vessels of 244,098 tons; of the new construction six vessels are first-class battleships, displacing 88,553 tons. Russia, with 220 ships with a total displacement of 351,400 tons, is constructing fifty-five of 158,168 tons displacement, of which eight are battleships, 105,754 tons. Japan, youngest among naval powers, has 142 vessels built which displace 238,028 tons, and is building twenty-two of 9,980 tons; and Austria, with 100 vessels, averaging barely 1,000 tons each, is building five, averaging more than 9,000 tons.

The existing strength in vessels of these navies, the prospective strength and the total number of vessels and of tonnage in each may be presented most clearly in tabular form:

	Built.	Ton- nage.	Build- ing.	Ton- nage.	Totals.	
					Ves- sels.	Ton- nage.
United States	109	278,259	44	300,484	153	578,743
Great Britain	546	1,401,018	78	406,856	624	1,807,874
France	370	590,942	83	213,332	453	804,274
Germany	205	382,715	20	100,713	225	483,428
Italy	200	244,098	15	97,057	215	341,155
Russia	220	351,400	55	158,168	275	509,568
Japan	142	238,028	22	9,980	164	248,008
Austria	100	102,985	5	45,100	105	148,085

Bringing together for convenience the figures relating to battleships and armored cruisers under construction, we have this table:

	Battle- ships.	Ton- nage.	Armored Cruisers.	Ton- nage.
United States	9	131,200	8	111,800
Great Britain	11	167,750	20	205,700
France	6	87,780	10	110,546
Germany	5	62,779	2	18,238
Italy	7	85,553	1	7,294
Russia	8	105,754	..	
Austria	2	21,200	2	16,600

From these figures it is apparent that Austria is making an effort to gain a place among the naval powers. The rating of these powers, based on these figures, would place the United States in the third place in weight, but in the fifth place in numbers. The program of construction of the chief European powers will not alter this rating. This showing should not be construed, however, as evidence that the special effort now making for increase of the American navy is not fully justified. Our task for the upholding of the Monroe doctrine is scarcely less than Eng-land's with her colonies.

MONOLITHIC CONCRETE.

Editor Marine Review:—There are some fictions which die hard and one of the most generally accepted and enduring is that a bridge, wall or pier of concrete is a monolith, whereas it is only an agglomeration of separate pieces resembling in that one respect those carefully-jointed columns of Roman temples which are the admiration of modern architects but without their claims to durability.

It is well known to workers in hydraulic cement that Port-land cement will not bind two pieces of old concrete together. It will firmly unite bricks or stone, but applied with the same ob-ject to concrete which has already set, it is of no value. Setting takes place rapidly; even the dinner hour on a very hot day is sufficient to permit this crystallization, and work renewed im-mediately afterwards is quite distinct and separate from that of the forenoon. In view of the rapidly extending use of concrete for almost every purpose to which brick, stone and even iron and wood have been employed, this drawback is a serious matter. To some extent it is overcome by the introduction of iron rods throughout the mass, which give it certain amount of unity, but even this assistance is only partial and may not be permanent, for the work is liable to admit water which, trickling through any exposed joint, is certain, in course of time, to have its effect upon the metal.

There have been some costly failures of this kind with marine work, which may be attributed to want of cohesion among the separate blocks which formed the seawall or pier. After a furious gale on an exposed part of the British coast, I have seen an immense gap broken through an enormous mass of this so-called monolithic work, which, if it had really been monolithic or even properly bound together in a homogeneous mass, would not have occurred. The blocks had been laid in cement mortar, which, as has just been pointed out, has no co-hesive property whatever. The work was therefore a block of separate stones, and when the extra force of a storm-swept sea was applied the only result possible was a collapse. This no doubt was a subject for the consideration of engineering readers, and in view of the possible recurrence of such mishaps at any unexpected moment, it is well to direct attention to the need of caution.

Perhaps the most ordinary illustration of the futility of at-tempting to join new concrete work or cement mortar to similar material which has already set, is furnished by rough concrete where an attempt has been made to put a finishing coat of Port-land cement mortar on a concrete wall. It is always found that the new finish comes away in a short time. If it endures for one season it has done well.

There are two remedies for this state of things, the old cook-ery book formula of grouting with mat cement being put aside as of no value. The best method is never to let the work set, but to keep on adding the new material without stopping for dinner, supper or sleep. Where this can be done, a true mono-lith may be obtained. If on the other hand these conditions of continuous application of material are not available, then there is no process of binding old and new concrete together which has given any promise of success, excepting the recently discov-ered method of using annealed cement for the joints and for attaching the outside of finishing coat. I do not understand that the inventor of this method, Mr. H. J. Livingstone of Baltimore, Md., has published any details of his process but he has submitted a number of experimental tests to United States engineers and others interested, and these experiments are said to have received strong endorsement.

From what has been learned of it, this annealing is an ex-pensive process, is applicable to any Portland cement, and where a joint is made of such material, the work does not break at the joint, but in the concrete. The cost of the added material, is said to be practically nothing and it is claimed that it does not deteriorate the cement; that it is so small as to have little or no effect on the general composition, except as to change in crystal-lization brought about by innocuous material. In one test report it is noted that old concrete covered with the annealed cement has been heated to 140° F., and when cooled to 100° it was plung-ed into water at 50° and the adhesion was not impaired. Sub-sequent weather exposure to continued soaking and freezing showed the same power of resistance.

So it may be said that strong permanent concrete work can only be obtained under two conditions, preferably the genuine, not the so-called, Monolithic process, requiring one continuous operation, or failing of that the use of annealed cement mortar.

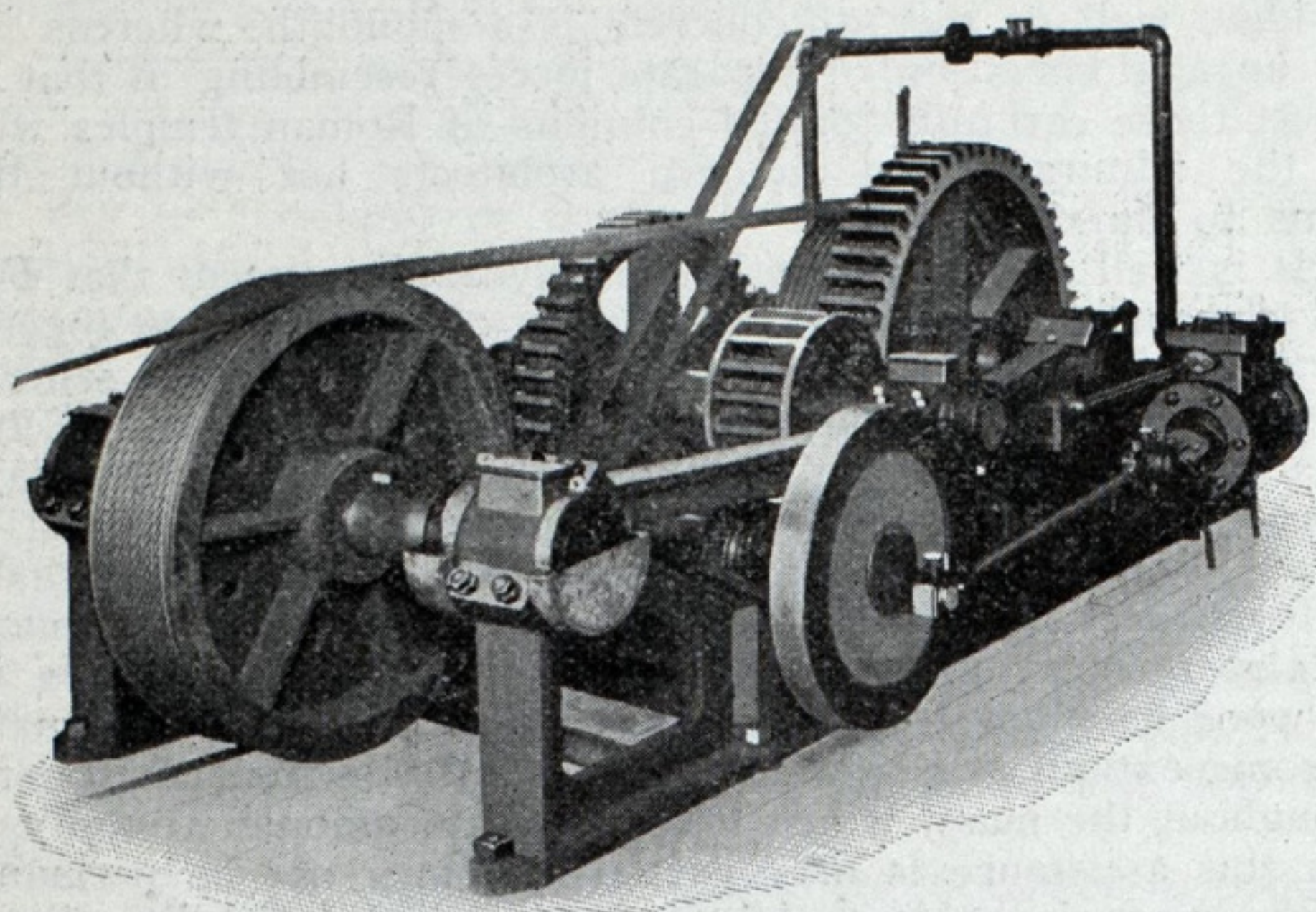
Washington, D. C., Mar. 2, 1903. ENGINEER.

President Roosevelt succeeded at the last moment in ham-mering his views into the senate naval committee, and the provi-sion in the naval bill that the new battleships shall be limited to 12,000 tons displacement was stricken out. The provision for two new cruisers was also stricken out and two new battleships substituted for it. The program for naval increase therefore in-cludes three new battleships of 16,000 tons displacement and two battleships of 13,000 tons displacement.

Robert Curr, well known in lake ship building circles, is now assistant superintending constructor at the New York works of the Townsend & Downey Ship Building & Repair Co.

SPECIALTIES OF SUPERIOR IRON WORKS.

With the great development of iron mining interests at the head of Lake Superior and the very large movement of coal and



Car Haulage Engine for Dock Service.

grain to and from Duluth and Superior, several engineering concerns at these ports, equipped for marine trade as well as for mine and dock work, have of late years built up quite a large business. The Superior Iron Works, West Superior, Wis., of which Frank Hayes is lessee, engages in a variety of machinery and foundry work and is very well equipped for marine engine repairs. They design and construct any form of special machinery and do a general jobbing and repair business. In addition to their own foundry work they have for some time past been furnishing the Superior Ship Building Co., which is a part of the lake ship building combination, with castings of various kinds for both hulls and engines of some of the big new steel steam freighters. Two types of special engines built at these works are shown herewith. One of these is for cable haulage, for use in shifting cars on coal docks and elsewhere. It is very much in demand and has met with approval wherever it has been used. This engine is very clearly shown in the smaller illustration. The larger cut represents a special, three-drum engine for handling dump scow lines in dredging operations, which is this year being introduced by the Superior works. Wire lines are used, one on each drum, and the drums are operated by means of friction clutches, any one or all of which may be thrown in at any time. All are driven by a set of double engines and worm gear. Similar engines and mechanism are also being fitted to dump scows for another purpose, that of closing the hopper doors. Circulars dealing with these different machines may be had for the asking.

The Superior works also has a large business in special machines for chair factory work and this is, in fact, their main output.

CANADIAN PACIFIC RAILWAY CO.'S FLEETS.

With the purchase of fourteen transatlantic steamers from the Elder-Dempster Steamship Co. the Canadian Pacific steps into the ranks of large steamship owners. Excluding the small steamers plying on the inland lakes and rivers of British Columbia, and some small steamers owned by the company at different points, the fleets owned are as follows:

	No. of steamers.	Gross tonnage.
Upper lakes fleet	3	7,167
Canadian Pacific Navigation Co.'s fleet, British Columbia	10	5,748
Transpacific fleet	5	23,715
Beaver Line (passenger and freight)	6	39,327
Elder-Dempster freight line	8	54,143
Total	32	130,100

The Canadian Pacific Navigation Co. has two steamers under construction, one at Vancouver and the other at Newcastle-on-Tyne, England. In addition the Canadian Pacific Railway is also largely interested in the Canada-Australasian Line, operating between Vancouver and New Zealand and Australia, which has under charter five steamers representing about 25,000 tons gross.

STEAMSHIP PASSENGER TRAVEL TO NEW YORK.

Engineering of London has made it a point for some years to compile the westbound passenger travel to the port of New York. The figures for 1902 are now available. It is worthy of note that the ships of the Morgan combination, so-called, carried 66 per cent. of the cabin passengers and 55 per cent. of the steerage passengers.

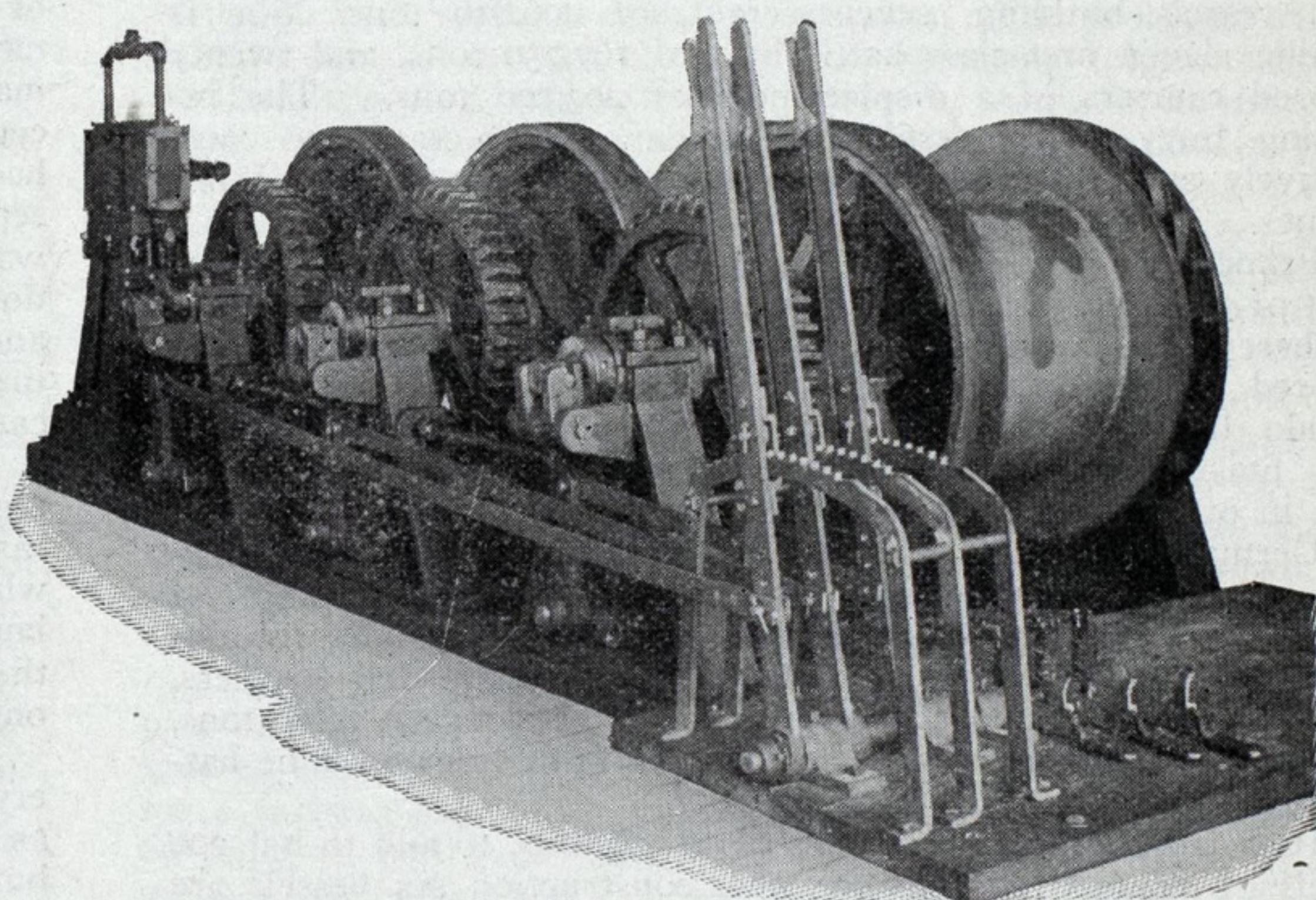
When it comes to separate lines, it appears that the Bremen ships of the North German Lloyd Co. made the best record, their average of passengers per trip for 1901 being 1,130 and for

last year 1,242. The other leading lines make the following returns: Hamburg-American, 1,012; Red Star, 999; French Line, 985; Navigazione Generale Italiana (mostly steerage ships), 962; La Veloce (largely steerage), 941; Prince Line (including ships exclusively for steerage), 928; White Star, 902; North German Lloyd Mediterranean, 819; Holland-America, 807; Anchor Line Mediterranean, 795, and Cunard, 784.

If attention is given exclusively to cabin passengers, though, a very different order is observed. Thus, the Cunard Line has long had the lead in this respect, the average number to a trip last year reaching 320. The White Star ranks second, with 283, while the Bremen ships of the North German Lloyd Co. averaged 275, the American Line 267, the Anchor Line 200 and the Hamburg-American, 194. Probably the retirement of the Deutschland from service for repairs for a large part of 1902 gave the last mentioned company an exceptionally low rating. The French Line is credited with an average of 146 to the trip last year.

Taking steerage passengers only into consideration the Bremen and Southampton ships of the North German Lloyd Co. make the best showing. Their average last year was 958, or nearly 80 per cent. of all their passengers. The Cunard company had 464 steerage passengers to the trip, or only 59 per cent. of its total patronage. The Prince and two Italian lines rank next after the North German Lloyd Co. in the average number of persons carried on a trip in the steerage. The figures for them all exceeded 900.

It is a curious fact that for the four years beginning with 1890 transatlantic travel to New York was very much heavier than during the five years immediately ensuing. Cabin passen-



Engine for Handling Dump Scow Lines in Dredge Work.

gers averaged about 135,000 during the former period and about 91,000 during the latter. The maximum (150,000) was attained in 1891, when exceptionally low cabin rates prevailed, and the minimum (81,000) in 1898. During the four years ending with 1902 there was an irregular but marked increase, but last year's figures (139,848) did not equal those of 1890 or 1891. Most of this time the number of emigrants has fluctuated in much the same fashion. In round numbers the average for 1890-'93 was over 390,000 a year; for 1894-'98 it was about 220,000, while from 1899 to 1902 the actual figures jumped from 303,762 to 574,276. Prior to 1901 the steerage passengers were about three times as numerous as the cabin passengers, though in instances only about two to one. The proportion last year was slightly over four to one. The number of emigrants brought to New York in 1902 was about 120,000 greater than in 1891, when the next best record was made, and 135,500 more than in 1901.

The Consolidated Lake Superior Co. has declined the contract for steel rails offered by the Temiskaming railway commission. Vice-President Theodore C. Search stated to the commission that the blast furnaces of the Algoma Steel Co. were still incomplete and while there were promises that they would be ready in April, yet the fact that the blowing engines were not ready for delivery rendered the situation uncertain. He further added that the company's contract supply of pig iron from the United States had been exhausted and it would be unwise to accept the rail contract when delivery could not be guaranteed.

The United States circuit court, southern district of New York, has issued a decree enjoining the Aultman & Taylor Machinery Co. and Thayer & Co. from using the trade name Babcock & Wilcox or the initials B. & W. upon any steam boilers manufactured by them. It appears that the company had used the words Babcock & Wilcox in combination with other words to describe their output and the Babcock & Wilcox Co. represented that it was infringement upon their trade mark. For instance one of the phrases objected to, and forbidden by the court, was "The Babcock & Wilcox horizontal safety water-tube steam boilers built by the Aultman & Taylor Machinery Co."

ITEMS OF GENERAL INTEREST.

It is understood that the Hudson River Day Line has decided to add another steamer to its service and has already approved the plans.

Joseph Wheaton, the distinguished ironmaster, says that an output of 20,000,000 tons of pig iron may be reached in the United States during the present year.

The National Fulton Brass Manufacturing Co. of Detroit is the lowest bidder for the construction of a lighthouse on St. Marten's reef near the north end of Lake Michigan.

Representatives of Lloyds in this country are engaged in the preparation of a register that will be devoted to yachts, yacht owners, yacht builders and yacht clubs. The work is being directed from the New York office of Lloyds. The book will be out about May 1.

President Roosevelt has signed the agreement drawn under the terms of the Platt amendment providing the acquisition by the United States of a naval station at Guantanamo and a coaling station at Bahia Honda, both in Cuba. It is the purpose to make extensive improvements at Guantanamo.

Probably no vessel register in the world is more complete as to details of the ships which it classes than the Great Lakes Register compiled under the direction of Capt. F. D. Herriman of Cleveland. Of course other registers are of wider scope, as this one is confined to lake vessels, but with its variety of symbols and abbreviations the Great Lakes Register encompasses a vast amount of information regarding the ships of the lakes. The 1903 edition is just from the press.

President Cassatt's announcement that the Pennsylvania Co. is about to place orders for new equipment which will cost \$24,000,000 is certainly very encouraging from a general business point of view. Mr. Cassatt is quoted as saying that his company is going into the market immediately for 19,000 steel cars of 50-ton capacity each, and for 250 locomotives. It is also stated that the Pennsylvania Co. will spend \$67,000,000 in improving its lines between Pittsburg and Philadelphia within the next two or three years.

Commander A. V. Wadharus, U. S. N., has been ordered to Chicago where he has assumed charge of the recruiting office and hydrographic office in the Masonic Temple. He has had nineteen years sea service and sixteen years shore duty, part of which was as lighthouse inspector on the Gulf of Mexico coast with station at New Orleans. The commander is a pleasant gentleman, makes friends readily and has expressed a desire to meet as many of the lake captains and mates as possible previous to their starting the season's work.

D. C. Deegan, who has been in the vessel supply business at Chicago for twenty years past and who had a wide acquaintance among the lake marine fraternity, has closed his business at 52 Rush street and joined the firm of Foster & Co., 209-211 S. Water street. Mr. Deegan found his old quarters too small to care for all the business he was offered. The new connection will give him facilities for carrying and delivering goods which will greatly improve the service. The gasoline launch he formerly used will be retained and another will be added for his year's service.

The naval general board favors the restoration to the commissioned personnel of the navy of some 100 officers who went out of the service under the provisions of the law enacted in 1882. These available officers were honorably discharged on their graduation from the naval academy at a time when the output from Annapolis exceeded the list of available vacancies and when there did not seem to be any necessity for enlarging the list of officers. Since then the dearth of officers and the increased demands of the personnel have created a serious situation and something of a problem to which the department authorities have been applying themselves. The trouble with most of the remedies proposed is that immediate relief is not afforded.

This would be possible by allowing the officers discharged in 1882 and subsequent years to return to the service.

The navy department was somewhat exercised over the fact that the senate committee on naval affairs tried to limit displacement of the battleships provided for in its amendments to the naval bill to not more than 12,000 tons each. This is directly at variance with the late policy pursued by the navy department, the latest designs (Connecticut and Louisiana) being 16,000-ton ships. The feeling is pretty general in naval circles that naval constructors and not congressmen should design the vessels of the navy. In fact it is extremely odd that men who have no knowledge of ship building whatever should have anything to say about design. It is all very well for them to determine whether there shall be warships or not and how much money shall be appropriated for naval increase but to presume to dictate types is all nonsense.

It is reported in Washington that the navy department has concluded to hereafter stick to its own specifications and not allow ship builders to submit alternative bids upon their own designs. The reason for this is the animosity stirred up over the recent cruiser awards. The contracts were first awarded to Cramps for both vessels but the award was subsequently amended, however, to give one of the cruisers to the New York Ship Building Co. The Cramps were the lowest on the alternative bid and the New York Ship Building Co. on the government specifications. Cramps thought that as their bid was the lowest they should have both contracts; the New York Ship Building Co. thought that as their bid was offered in good faith and was the lowest on the government's specifications they should have both contracts. It appears that splitting the award has pleased neither.

"KEARSARGE" ASBESTO-METALLIC PACKINGS

Made from pure Asbestos yarn and fine brass wire, firmly woven together

GASKETS

will not blow out, will hold against any steam pressure, will stand highest temperature.

Used exclusively on the hand holes of Babcock & Wilcox and other water-tube boilers.

SHEET PACKING

The most reliable flat packing on the market for all conditions of steam service

PISTON ROD PACKING

For high speed, high temperature, high pressure, with or without wire interwoven.

FLANGE JOINT GASKETS

More reliable than rubber or metallic and cost much less. Will not blow out. Unaffected by high temperature. Without expansion or contraction. Works perfectly whether conditions are favorable or unfavorable.

Write for samples, prices and full information.

NEW YORK
MILWAUKEE
CHICAGO
ST. LOUIS
BOSTON

H. W. JOHNS-MANVILLE CO.
100 WILLIAM ST. NEW YORK

PHILADELPHIA
CLEVELAND
PITTSBURG
NEW ORLEANS
LONDON

ELIAS GUNNELL,
PRESIDENT.

THOS. J. PRINDIVILLE,
VICE-PRESIDENT.

L. E. GEER,
SEC'Y AND TREAS.

CHARLES C. WEST,
MANAGER.

MANITOWOC DRY DOCK COMPANY, SHIP BUILDERS.

FACILITIES FOR REPAIRS OF STEEL AND WOODEN VESSELS.

DRY DOCKS AND MAIN OFFICE: MANITOWOC, WIS.
GEO. B. BURGER, SUPT.

BRANCH YARD: 34 ROBERTS STREET, CHICAGO.
THEODOR KNUDSON, SUPT.

United Marine Mfg. & Supply Co.,

MANUFACTURERS OF AND
DEALERS IN

ELECTRICAL MATERIAL

ALBERT C. JAHL, General Manager,
100 William St., New York, U. S. A.

FOR SHIPS AND FORTIFICATIONS.

TRADE NOTES.

Mr. C. C. Murray will be connected with the Railway Appliances Co., with headquarters at Pittsburg, giving his time more particularly to the sale of Q. & C. pneumatic tools.

The Waterbury Brass Co., 122-130 Center street, New York, one of the oldest and largest concerns of its kind in the country, recently withdrew all prices, owing to high price of copper and general conditions prevailing in the metal market.

The H. W. Johns-Manville Co., 100 William street, New York, has just issued an illustrated price list and directions for applying asbestos boiler coverings. While the pamphlet is of only ten pages it is carefully indexed and is, for its size, a model of convenience.

At a recent meeting of the board of directors of the Seamless Steel Tubes Co. of Detroit the following officers were elected: President, W. C. McMillan; vice-president, T. H. Simpson; secretary and treasurer, George M. Black; assistant secretary, R. H. Phillips; manager, C. H. Wood.

The United States government recently undertook extensive tests of anchors, foreign and domestic, and it would certainly seem from the manner in which the navy department is buying anchors of the Baldt kind that the tests must have been highly favorable to that anchor. The Baldt Anchor Co. is now making at its works in Chester, Pa., for the United States government, sixteen anchors weighing 16,500 lbs. each and six of 13,000 lbs. each. They recently shipped to the Boston navy yard eleven anchors of 16,500 lbs. each and thirteen of 13,000 lbs. each, making a total of half a million pounds for the thirty-six anchors. The Baldt company has recently increased its sales of anchors

Steam Barge for Sale.

For Sale—Steam barge 131 ft. long, 25 ft. wide, 9 ft. deep; lumber capacity 260 M. ft.; coal 375 tons. Everything pertaining to this boat is in first class conditions. Terms cash. Address Lock Box 35, St. Clair, Mich. Mar. 26.

Tug for Sale.

Tug Maurice W. for sale. Practically new; 48 ft. over all, 12 ft. beam, 5½ ft. draught. Engine, boiler and wheel of Sutton Bros. make. Engine 10x12; 100 lbs. steam; 50 in. wheel. Cheap for cash. Address L. E. Welch, Mackinaw City, Mich. t. f.

on a wonderful scale. It is quite evident that the old-time stock anchor will shortly be out of the market entirely. Nearly all the torpedo boats and the torpedo boat destroyers are equipped with the Baldt anchor and also a great many of the transports.

The C. W. Hunt Co., West New Brighton, Staten Island, N. Y., has just issued a catalogue regarding electric hoists for manila or wire rope. Electric motors are fast displacing steam engines and shafting in every industry on account of their convenience of installation and economy in operation. Nowhere is this saving more apparent than in intermittent hoisting work. With electric hoists there is no loss due to condensation in long steam pipes which frequently amounts to 25 per cent. of the power used, and there are no steam pipes with joints to keep tight, as with steam engines, with shafting the loss in transmission of power due to the friction at the bearings is very high. At one steamship wharf in New York city it took 3 tons of coal per day to run the shafting alone. This loss is entirely eliminated with electric power. The hoists of the Hunt company are simple, durable, convenient to operate, do not require a skilled or licensed engineer and their mechanical and electrical efficiency is of the highest grade.

Capt. Charles Anderson of Sheboygan has purchased the schooner Josephine Dresden of Racine.

If you want
to KNOW

WHY

**Dearing Water
Tube Boilers
are best ? ? ?**

Drop us a postal

Dearing Water Tube Boiler Company

288 to 296 Fort St., West.

DETROIT, MICH.

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (AUGUST, 1902)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

French Navy	-	-	-	-	-	-	-	-	268,020 H. P.
English Royal Navy	-	-	-	-	-	-	-	-	745,900 "
Russian Imperial Navy	-	-	-	-	-	-	-	-	184,900 "
Japanese Imperial Navy	-	-	-	-	-	-	-	-	110,700 "
Austrian Imperial Navy	-	-	-	-	-	-	-	-	32,900 "
Italian Royal Navy	-	-	-	-	-	-	-	-	13,500 "
Chilian Navy	-	-	-	-	-	-	-	-	26,500 "
Argentine Navy	-	-	-	-	-	-	-	-	13,000 "
The "Messageries Maritimes" Company	-	-	-	-	-	-	-	-	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	-	-	Steamships
plying between Dieppe and Newhaven	-	-	-	-	-	-	-	-	18,500 "
Total Horse Power of Boilers <u>in Use</u>									1,501,520

WORKS: Ateliers et Chantiers de l'Ermitage, at Saint-Denis (Seine), France.

TELEGRAPHIC ADDRESS: Belleville, Saint-Denis-Sur-Seine.

GROWTH OF HAWAIIAN TRADE.

The benefits to the agricultural industries of the Hawaiian islands resulting from the closer relationship with the United States which has come through annexation are shown by some remarkable statements recently made by a committee organized in those islands in the interest of improved agricultural operations and especially diversification of agricultural products to meet the demands of the United States for tropical products of various kinds. This committee was appointed by a public meeting recently held in the Hawaiian islands, and in its address to the people of the islands says:

"The importance and almost necessity of an institution like the one contemplated is too evident to require exposition. For years past, the agricultural interests of these islands have been insignificant, and their pursuit unprofitable. With an uncertain and distant market—with little or no encouragement, or facilities given to foreign tillers of the soil, without proper knowledge of the soil, or sufficient capital to experiment upon its capabilities, most of the agricultural enterprises have languished or utterly failed. And with the exception of a few sugar and coffee plantations, the proprietors of which have invested too much capital to be able to abandon them without heavy loss, and which were still struggling on with doubtful prospects, the whole amount of agricultural operations at these islands consisted in the raising of fruit and vegetables for the fleet of whale-ships that semi-annually touched here for supplies.

"Within the last two years, however, a great and sudden change has taken place in the prospects of this group. The extension of the territory and government of the United States to the borders of the Pacific, the wonderful discoveries in California, and the consequent almost instantaneous creation of a mighty state on 'the western front of the American union,' has, as it were, with the wand of a magician, drawn this little group into the very focus of civilization and prosperity. We find ourselves suddenly surrounded by intelligent, enterprising neighbors, who call loudly to us to furnish of our abundance and receive in exchange of theirs. Our coffee and sugar no longer remain piled in our warehouses. Our fruits and vegetables no longer decay on the spot where they were grown. We are not even compelled to seek for them a market, but clamorous purchasers come to our very doors and carry off our supplies with an eagerness that has caused us to feel a scarcity ourselves, and we are assured that not only for all these, but for any other product of the soil that we will raise, a ready and increasing demand may be relied on from our enterprising neighbors. The native

government too, impelled by the irresistible influence and example of the Anglo-Saxon energy and progress, which it sees in every direction, is relaxing its former tenacious grasp on arable lands of the islands and even investing and encouraging their cultivation of foreign skill and capital."

The export figures furnished by the treasury bureau of statistics continue to indicate that the foreign commerce of the United States is resuming its normal conditions. The January exports were larger than those of any preceding January in the history of our commerce except those of the year 1901, in which the January figures were about \$2,000,000 above those of last month. The total value of exports in January, 1903, was \$134,040,952, against \$136,325,601 in January, 1901, \$108,426,674 in January, 1898, and \$67,673,669 in January, 1893. Thus the exports in January, 1903, were double those of January, 1893. Turning to the import side, last month's figures show the largest January imports in the history of our commerce. The total imports in the month of January, 1903, were \$85,109,891, against \$79,138,192 in January of last year and \$75,168,267 in January, 1893. For the twelve months ending with January, 1903, the total imports approximate the billion dollar line, being \$975,283,637, against \$742,068,925 for the twelve months ending with January, 1898. This increase in importations is chiefly due to the continuing demand of the manufacturing interests for raw material from abroad for use in their industries. In the calendar year 1902, the manufacturers' materials imported amounted to \$453,000,000, against \$391,000,000 in the preceding year and \$248,000,000 in the calendar year 1896.

"Seaboard Steel Castings"

A Guarantee of Quality.

Open Hearth Steel Castings of the
Highest Grade for Locomotive,
General Machinery and Shipbuilding
Work.

Subject to U. S. Government, Lloyds, Railroad and
Other Highest Requirements.

Seaboard Steel Casting Co.,
Chester, Pa.

PITTSBURGH WHITE METAL CO.

MANUFACTURERS OF THE BEST

BABBITT and ANTI-FRICTION

Metals

Known for any Purpose.

Made from the Best Materials.

Price and Quality Guaranteed and Always
Consistent with the Market.

PITTSBURGH, - PA.

U. S. Engineer Office, Duluth, Minn., Feb. 6, 1903. Sealed proposals for dredging about 40,000 cu. yds. at Ashland, Wis., and Ontonagon, Mich., will be received here until 10 a. m., Mar. 9, 1903, and then publicly opened. Information on application. D. D. GAILLARD, Capt., Engrs. Mar 5

U. S. Engineer Office, 57 Park st., Grand Rapids, Mich., Feb. 9, 1903. Sealed proposals for dredging harbors on east shore of Lake Michigan will be received here until 3 p. m., Mar. 11, 1903, and then publicly opened. Information furnished on application. CHAS. KELLER, Capt., Engrs. Mar. 5.

U. S. Engineer Office, Duluth, Minn., Feb. 7, 1903. Sealed proposals for building in place the concrete south pier at Superior Entry, Wis., will be received here until noon, Mar. 9, 1903, and then publicly opened. Information on application. D. D. GAILLARD, Capt., Engrs. Mar. 5.

U. S. Engineer Office, Buffalo, N. Y., Feb. 3, 1903. Sealed proposals for pier extension at Little Sodus Bay, N. Y., and breakwater extension at Cape Vincent, N. Y., will be received here until 11 a. m., Mar. 5, 1903, and then opened; information furnished on application. T. W. SYMONS, Major, Engrs. Mar. 5.

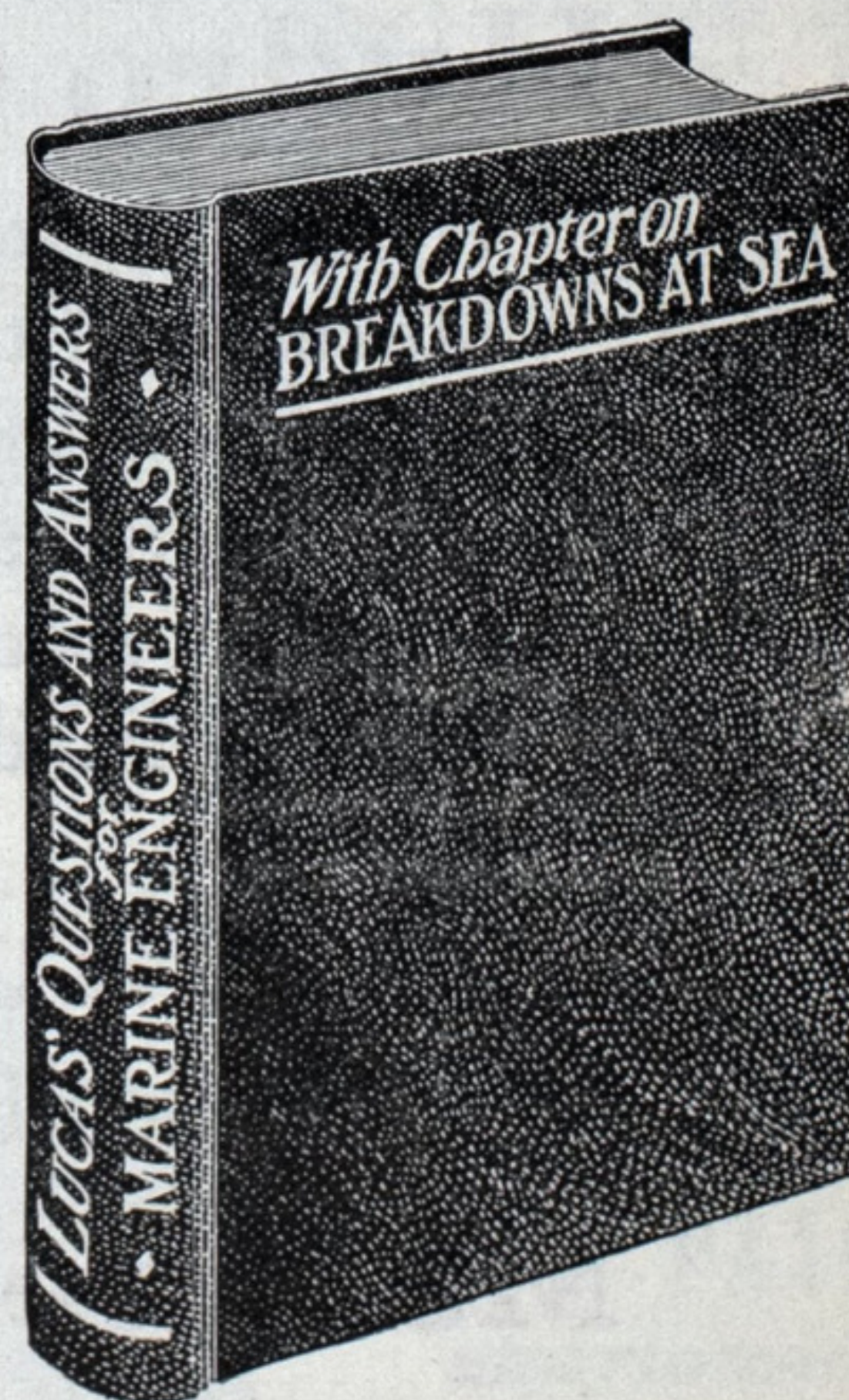
U. S. Engineer Office, Galveston, Tex., Feb. 23, 1903. Sealed bids, in triplicate, for improving Aransas Pass, Tex., by removing part of old jetty, will be received until 2 p. m., March 25, 1903, and then publicly opened. For information apply to C. S. RICKE, Capt., Engrs. Mar. 19.

U. S. Engineer Office, Grand Rapids, Mich., March 2, 1903. Sealed proposals for repair of south pier at Portage Lake, Mich., and extension and repair of piers at Frankfort, Mich., will be received here until 3 p. m., April 1, 1903, and then publicly opened. Information furnished on application. CHARLES KELLER, Capt., Engrs. Mar. 26.

A. J. MORSE & SON.
DIVING APPARATUS
140 CONGRESS ST. BOSTON.



LUCAS' QUESTIONS AND ANSWERS FOR MARINE ENGINEERS



PRICE, \$2.00 POSTPAID

TO ANY ADDRESS. ORDER TO-DAY.

MARINE REVIEW PUB. CO.
39-41 Wade Bldg. Cleveland, O

PNEUMATIC TOOLS
FOR ALL PURPOSES
SIMPLEST AND BEST
RAILWAY APPLIANCES COMPANY
CONSOLIDATED WITH THE Q-C COMPANY
GENERAL OFFICES
OLD COLONY BUILDING
CHICAGO.
NEW YORK
OFFICES
114 LIBERTY ST.

ANTONIO C. PESSANO,
President and General Manager.

GEORGE H. RUSSEL,
Vice President.

JOHN R. RUSSEL,
Secretary-Treasurer.

GREAT LAKES ENGINEERING WORKS

DETROIT, MICH.

Steel Ship Builders—

We have under construction a complete Ship Building Plant, modern in every detail and capable of handling the LARGEST SHIPS which the trade of the Great Lakes will require; also

Floating Dock—

A Floating Dock of all steel construction and equipped with the best pumping machinery and appurtenances, and with a capacity for Docking the largest Boats afloat or which may be built.

Marine Engines—

We build High Grade Engines for Lake and Ocean Service.

Propeller Wheels—

Improved designs of high efficiency, made of Semi Steel, either whole or sectional.

Hydro Carbon System—

We are the sole owners of the rights for applying this system to the Steamers of the Great Lakes. If your boilers are using too much coal, if you are short of steaming capacity, if you want to convert the objectionable black smoke into money, the HYDRO CARBON SYSTEM should receive your attention, as it successfully and economically handles each of the above cases.

Hydraulic Dredges—

We build all sizes for any service.

Marine Repairs—

and Supplies of all kinds, and Heavy Forgings.